U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-253 311

POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN

PROCEEDINGS OF CONFERENCE, SESSION (3RD) (RECONVENED),
HELD AT CHICAGO, ILLINOIS, ON MARCH 24-25, 1971.
VOLUME 1

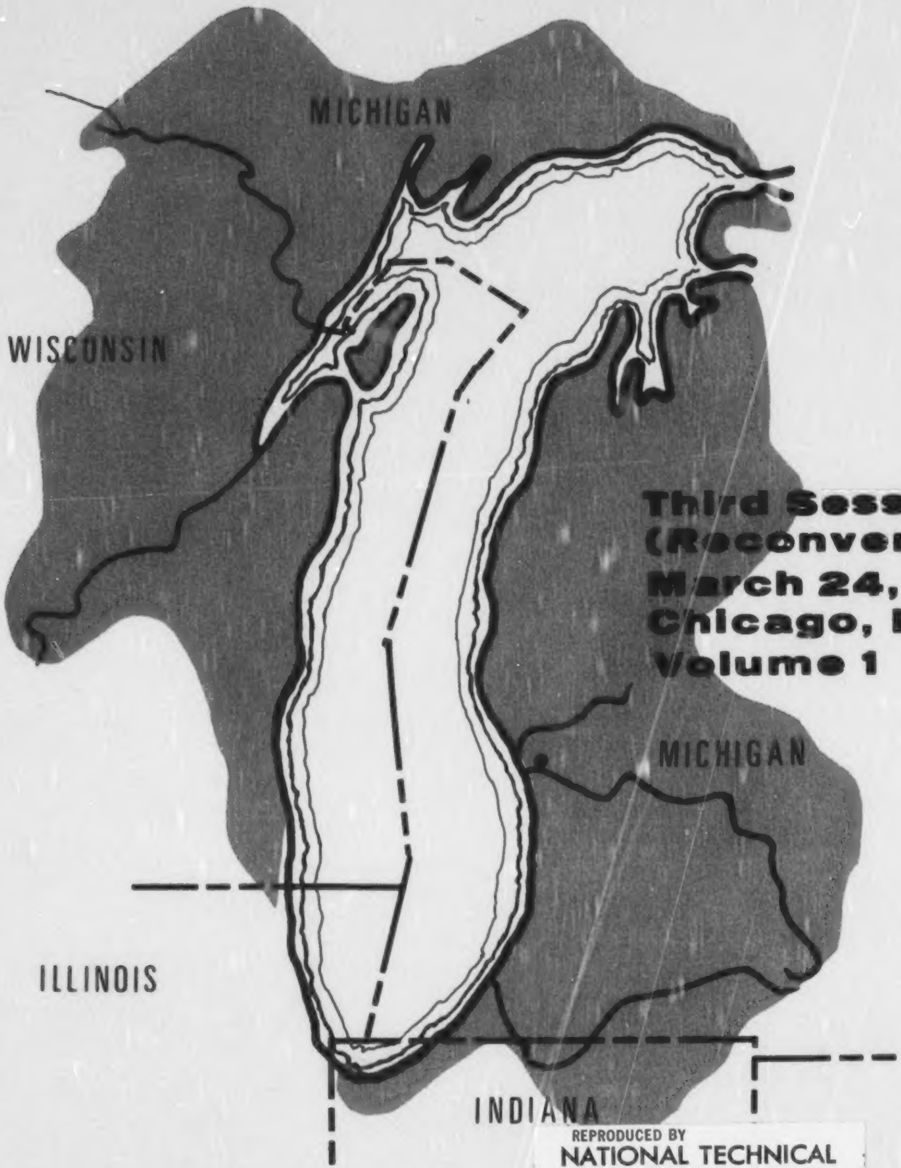
ENVIRONMENTAL PROTECTION AGENCY

25 MARCH 1971

161047

PROCEEDINGS

PB 253 311


MICHIGAN
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA

Third Session
(Reconvened) MAR 23 1971
March 24, 25, 1971
Chicago, Illinois
Volume 1

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

CONFERENCE

In the Matter of Pollution of Lake Michigan and its Tributary Basin

ENVIRONMENTAL PROTECTION AGENCY • WATER QUALITY OFFICE

RECONVENING OF THE THIRD SESSION OF THE CONFERENCE IN THE MATTER OF POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN IN THE STATES OF WISCONSIN, ILLINOIS, INDIANA, AND MICHIGAN - - VOLUME I

Grand Ballroom
Sherman House
Chicago, Illinois
March 23, 1971

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The report is on,

Reconvening of the Third Session of the Conference in the Matter of Pollution of Lake Michigan and Its Tributary Basin, in the States of Wisconsin, Illinois, Indiana, and Michigan, held in the Grand Ballroom of the Sherman House, Chicago, Illinois, on Tuesday, March 23, 1971, at 9:30 a.m.

The primary purpose of the conference was to consider heat discharges and thermal pollution.

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PROCEEDINGS

OPENING STATEMENT
BY
MURRAY STEIN

MR. STEIN: The conference is open.

This reconvening of the Third Session of the Conference in the Matter of Pollution of Lake Michigan and its Tributary Basin in the States of Wisconsin, Illinois, Indiana, and Michigan is being held under the provisions of section 10 of the Federal Water Pollution Control Act, as amended. The Third Session, which this is, first met on March 31 and April 1 of 1970. The conference reconvened on May 7, 1970, and workshop sessions were held on September 28 through October 2, 1970. An Executive Session was held on October 31, 1970. Under the provisions of the Act, the Administrator of the Environmental Protection Agency is authorized to call a conference of this type when requested to do so by a Governor of a State, and when, on the basis of reports, surveys, or studies, he has reason to believe that pollution subject to abatement under the Federal Act is occurring.

Opening Statement - Murray Stein

As specified in section 10 of the Act, the Administrator of EPA has notified the official State water pollution control agencies of this conference. These agencies are the Wisconsin Department of Natural Resources, the Illinois Environmental Protection Agency, the Indiana Stream Pollution Control Board, and the Michigan Water Resources Commission.

We have had many conferences on Lake Michigan. Many of you people have attended these conferences before. As you know, the purpose of the conference is to bring together State water pollution control agencies, representatives of the Environmental Protection Agency and other interested parties to review the existing situation, the progress which has been made, and lay a basis for future action by all parties concerned and to give the States, localities, and industries an opportunity to take any indicated action under State and local law.

We have developed an extensive abatement program for Lake Michigan under the auspices of this conference dealing with a wide variety of municipal and industrial waste sources. Requirements have been set for these municipalities and industries, time schedules have been set, and we think the conferees of the States and the Federal Government have taken care to see that these time schedules were met and we have taken action when slippage appeared from time to time.

I think we have had a considerable measure of success in the abatement program so far, and I dare say that the municipal-industrial water pollution control abatement program for Lake Michigan is probably as active and as extensive as any program in the United States.

We did know when we started this program that we were dealing with a very, very complex situation. There is not too much known about all the answers to the Great Lakes, although we certainly know a lot more than when we started.

The Great Lakes, their origin, the reason the waters remain fresh, the fate of pollutants in the lake, in large measure remains a mystery to this day. What we are trying to do is use the best modern techniques to preserve these lakes, because I have said again and again, but it bears repeating, that the Great Lakes are the greatest single freshwater source in the free world and we must preserve them.

The problems that we are dealing with now are problems concerning thermal pollution or heat discharges to the lake. This is a relatively new subject, and the reason for the many previous sessions and workshop

Opening Statement - Murray Stein

sessions of the Third Session of the conference has been due to the fact that we were grappling with a new very prickly problem on which there are clearly many, many divergent points of view.

These points of view were expressed with considerable clarity and force at previous sessions and workshop sessions of the conference. I am sure that the States, the citizens groups and industry has carefully considered all of the points of view and have come up with conclusions possibly in their own mind of suggestions to make, which hopefully are a little more developed and a little more mature on all sides than we may have had previously, because now we have had the advantage of hearing all the opposing points of view, hearing them analyzed, hearing them criticized and attacked, and hearing these points of view defended.

The primary purpose of this session of the conference today, as announced in the agenda, will be to consider the question of heat discharges in thermal pollution. We do recognize that there are other problems that some of the people want to take up, and some of the State agencies want to bring up, and that we want to bring up, and these are certainly of vital importance.

One of these problems will be the question of phosphates, and whether we have adequately considered the impact of the runoff from farmland in phosphates. In light of our experience and present knowledge to protect the lake, we also have the problem of whether our phosphates program we adopted at the last conference is sufficient. We said that the States would have to embark on the program, which they have, to cut the municipal loading of phosphates 80 percent on a Statewide basis.

Another question which has come up several times and we have not considered in the Lake Michigan conference but considered in other parts of the country is the question of discharge of chlorides to the lake. Obviously, this is an important matter in dealing with a freshwater lake and trying to maintain it as a freshwater lake.

We will also be open to other pertinent issues which any of the citizens, the industries, the municipalities, or the States feel appropriate.

However, for the purpose of the record, I would suggest that we stick to the thermal presentations today. In other words, anyone who is going to speak on these other topics will probably not be called today.

We are going to have a Federal presentation first, and since this is a session of a conference in the usual sense of the term and not a workshop session, we are going to refer to our usual practice in letting the States manage their own time. After the Federal presentation is concluded, we will call on the States in series -- the States can make their own presentation or use their time to call on a representative from that State to make the statement, and then we will call on the next State.

I think you all have to recognize that with all the people wanting to make presentations, we have to have some sort of order and not everyone can go first. We will try to make this as equitable as possible. I am sure we will have a break or a recess after the Federal presentation.

At that time, if you have any special problem with the time you feel you might appear, see your State agency. It will call you, and it will manage the time for you and have an appropriate time to appear if it is possible.

I ask you to cooperate with us on this. Again, one of the most difficult things in preparing a case is the mechanics of running that case. Many of the lawyers in the audience and on the panel know that is when you can bring a witness to the stand. And the problem with that is, 1) you don't know how long someone is going to talk when he gets on the stand, 2) you don't know how long the questioning is going to take. You are dealing with these unknowns and therefore you have to be patient and try to work your way through.

Now, just as an aside, the last time we were here in a workshop -- and I know a lot of people were restless -- I tried to get the cards in order, so that people who said they would speak for only one minute were put on first, in order to get them out of the way. Many who were repeats in the audience know what happened. The concept of 1 minute on the clock and that of the people who got up to speak for 1 minute was not exactly the same.

So I would ask that you try to be patient and that you try to work out with your State representative when you are going to appear. If there is any acute problem that can't be resolved on that basis, you and the State representative may come to me and we will try to work it out.

Now, with that I would like to again ask that the usual rules apply. Except the conferees, everyone should come to the lectern to make his statement, identify himself for the purpose of the record, and as usual we will have questioning by the conferees. Everyone in the audience, however, will be allowed to make a full statement. As this is not a workshop, hopefully we will get through much more rapidly than we have in the past.

I would like to ask the people at the panel table to identify themselves. Could we start right to my left, please?

MR. MACKIE: Donald Mackie of the Wisconsin Department of Natural Resources.

MR. FRANGOS: Thomas Frangos, Wisconsin Department of Natural Resources.

MR. DUMELLE: Jacob Dumelle, Member of the Illinois Pollution Control Board.

MR. CURRIE: David Currie, Chairman of the Illinois Pollution Control Board.

MR. BLASER: William Blaser, Director of the Illinois Environmental Protection Agency.

MR. BRYSON: Dale Bryson, Federal Environmental Protection Agency.

MR. MAYO: Francis T. Mayo, Regional Director, Region V of the Water Quality Office of the Environmental Protection Agency, and the Federal conferee.

MR. HARTLEY: Robert Hartley, Environmental Protection Agency, Region V.

MR. HERT: Oral Hert, Director, Division of Water

Pollution Control, Indiana.

MR. MILLER: Perry Miller, Technical Secretary, the Indiana Stream Pollution Control Board, and the conferee for Indiana.

MR. PURDY: Ralph Purdy, Executive Secretary, Michigan Water Resources Commission, Michigan conferee.

MR. FETTEROLF: Carlos Fetterolf, Supervisor of Water Quality Appraisal for the Michigan Water Resources Commission in the Bureau of Water Management.

MR. STEIN: And I am Murray Stein from the Environmental Protection Agency, Washington, D.C., and a representative of Administrator Ruckelshaus.

Before we start, I would like to again call your attention to the fact that we are making --

... Cries of "Can't hear you" ...

MR. STEIN: Before we start or continue, I would like to make an announcement that we are making a verbatim transcript of the statements made here of the entire proceedings. This transcript is made by Mrs. Hall, who is an independent contractor. If you should require or feel you want any portion of the transcript or the entire transcript prior to the time that it appears, you should make your own arrangements with Mrs. Hall. Usually we will not get the transcript printed for about 3 or 4 months, then we will make it available to the State agencies represented here, and it is available to all.

Let's continue with the Federal presentation now, Mr. Mayo.

STATEMENT OF FRANCIS T. MAYO, REGIONAL DIRECTOR, REGION V, WATER QUALITY OFFICE, ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, ILLINOIS

MR. MAYO: Mr. Chairman, fellow conferees, ladies and gentlemen. Administrator Ruckelshaus has directed to each of the conferees a letter expressing the concern and the position of the Environmental Protection Agency with respect to the need for thermal discharge controls on Lake Michigan. Identical letters have gone to each of the conferees.

I am going to read for the record that letter:

"The Lake Michigan Enforcement Conference will reconvene today. The major subject of the Conference will be the need to protect Lake Michigan from the threat of damage by large volume discharges of heated water. I am anxious at this time to express my personal concern for this problem. I urge the Conference to adopt strong standards to protect these valuable and vital waters.

"A considerable and growing body of evidence indicates that serious ecological damage will be caused by the increasing use of Lake Michigan waters to dissipate waste heat. The intake and discharge of waters used for cooling purposes, particularly by the electric power industry, is already large and is rapidly increasing in response to growing needs for electric power. At the present time 26 generating facilities are using Lake Michigan waters, all using once-through cooling. Plants planned or under construction will almost double present capacity within a few years. It is anticipated that a great many additional powerplants will be located on the shores of Lake Michigan by the year 2000. The prospective waste heat load from these plants poses a serious threat. Although other heat sources to the lake, such as industrial and municipal waste discharges, are minor in comparison to that of the power industry, they, too, are a source of concern.

"Thermal effects from unrestricted waste heat discharges may cause profound impacts on water quality and thus on other legitimate water uses. These effects are most serious in the shallow waters near the shore. The possible risks to Lake Michigan were described in a report prepared by the United States Department of the Interior in

September 1970 entitled 'Physical and Ecological Effects of Waste Heat on Lake Michigan'. This report pointed out that 'The inshore zone is in many respects the most important portion of Lake Michigan. It is the most used by man and is the most biologically productive.' The report also stated:

'At times very large percentages...of the waste heat discharged to the lake are diffused into the beach water zone; and studies of model plumes indicate that the influence of the heated water from a single discharge can cover many areal miles of the lake.'

"Plumes of heated water have been shown to alter the habits of fish by excluding them from areas of such heated water near shorelines, and by producing stress and possible mortality in the event of rapid cooling. Such plumes create broad areas of thermal influence in inshore waters influencing critical life history stages of certain fish and other aquatic organisms in the vicinities of such discharges.

"During the warmer seasons, waste heat accelerates the process of eutrophication within, and probably outside, the discharge area. Research indicates that added heat alters the usual population composition of algal species and heightens conditions favorable to the development of Clostridium botulinum type E bacteria during warmer seasons. The rate of eutrophication is controlled primarily by nutrient supply and water temperature, either of which may limit productivity. Nutrient levels in certain areas of Lake Michigan are now approaching critical levels, and a widespread, shallow water warming influence would contribute to accelerating eutrophication.

"Several major programs of resource management are also affected. The ultimate success of the United States-Canadian sea lamprey control program, the State and Federal lake trout program, alewife control, and various sport fisheries programs are all dependent upon the preservation of high quality lake waters.

"Those risks from waste heat discharges can be avoided. Alternatives to the use of once-through cooling are known and increasingly in use. Evaporative or dry cooling towers, cooling towers, cooling ponds or spray cooling canals can be employed in closed cycle cooling systems. The chemical and petrochemical industries in this country have used cooling towers as part of standard practice. In England nearly 300 cooling towers are in operation serving over 80 electric generating stations. Such alternative cooling systems are now both technologically and economically feasible for large powerplants. In this regard, I commend the Northern Indiana Public Service Company for their decisions to employ cooling tower facilities at the Baily

Plant and Consumers Power Company for their recent agreement to backfit the Palisades Plant with cooling towers.

"I recognize that certain environmental effects may possibly result from employment of alternative cooling systems. Such effects, however, appear clearly less serious than those posed by once-through cooling. To a large extent they may be avoided or minimized by proper design of the system or location of the plant.

"The Great Lakes are an irreplaceable national asset. One of these lakes, Lake Erie, has already suffered serious harm. The quality of Lake Michigan waters, though still high, has begun a steady and measurable decline, with associated damage to its biological systems. Although several other sources of ecological damage to the lake exist, thermal discharges are increasingly important and may well accelerate the harm caused by other pollutants. It is my conviction that if there are feasible methods to avoid this serious risk of harm posed by thermal discharges, those methods must be adopted.

"We must recognize that many unknowns exist in the problem we now confront. Much research is required before we can fully understand the nature and extent of effects from thermal discharges. More must be known also about the specific water quality conditions of Lake Michigan.

F. T. Mayo

In the face of such unknowns, however, we must choose the course of caution. For far too long precautions against environmental damage have awaited a full understanding of the threat. The march of progress has aggravated environmental damage while proposed safeguards were under consideration or studies were being performed.

"In the case of Lake Michigan, we cannot afford further delay. Stringent standards must be established to prevent damage from thermal discharges. In particular, I believe that limitations should be placed on large volume heated water discharges by requiring closed cycle cooling systems using cooling towers or alternative cooling systems on all new powerplants and addition of such cooling facilities to plants now under construction. (Applause)

"In addition to the development of stringent thermal standards for Lake Michigan, I would like to direct your attention to the need for setting implementation schedules for plants now under construction or in operation such that their discharges will be brought into compliance as soon as possible.

"I urge your consideration and adoption of clearly defined temperature standards and look forward to your submission of the Conferees' recommendations to me in the near future."

F. T. Mayo

There is a need to emphasize that the recommendation of Mr. Ruckelshaus, that large volume heated water discharges be required to impose closed cycle cooling systems or alternative cooling systems to all new powerplants and additions of such cooling facilities to plants now under construction was not lightly taken.

There was most serious consideration of the significance of that proposal. It was made in the light of the Agency's considered opinion that the importance of Lake Michigan is of such consequence that this is the most reasonable approach that the Federal Government can propose at this point in time.

We will be offering for the conferees this morning proposed Lake Michigan thermal discharge regulations which will speak to specific receiving water criteria that could be accepted by the States and enacted by the States into their Water Quality Standards.

We feel that the proposed regulations are reasonable, and when applied to existing discharges and the limited discharges from powerplants not yet in operation from which there would be the release of waters only from blowdown purposes can constitute a basis for reasonable protection of the waters of Lake Michigan from thermal waste discharges. We are anxious that the States take these recommendations, have private discussions, and employ them with the respective State water quality standards. We are anxious also that the States join with the Environmental Protection Agency in our proposal in the recommendations of Administrator Ruckelshaus that for the powerplants not yet in operation that there be concurrence in a requirement that they go to other than once-through cooling.

I should like to make it clear, however, that the position of the Environmental Protection Agency to work as cooperatively and as constructively as possible with the States on that point, but that we are prepared to employ the full extent of the administrative and the legislatively defined processes that are available to the Environmental Protection Agency to achieve that end.

As we proceed this morning, the next presentation will be that of the recommendations of the Lake Michigan Enforcement Conference Technical Committee on Thermal Discharges. That presentation will be made by Mr. Robert Hartley. Following that, we will have a presentation of the proposed Lake Michigan thermal discharge regulations. That presentation will be made by Mr. Dale Bryson. Following Mr. Bryson, there will be a presentation by Dr. Donald Mount concerning thermal requirements for Lake Michigan and speaking to the proposed thermal standards for Lake

Michigan as they will be presented by Mr. Bryson.

Mr. Chairman, I suggest that, at this point, we proceed with the presentation by Mr. Hartley.

MR. STEIN: I wonder if you could come here. You have a few additional requests; you may want to look at these.

MR. MAYO: I think, Mr. Chairman, it would be appropriate, at this time, to have the statement from Mr. David Cleverdon, the Executive Assistant to Congressman Mikva.

STATEMENT OF THE HONORABLE ABNER J. MIKVA, U.S. HOUSE OF REPRESENTATIVES, WASHINGTON, D. C.

(READ BY DAVID CLEVERDON)

MR. CLEVERDON: Thank you, Mr. Mayo.

Congressman Mikva regrets that he could not be here today. As you know, there is important business in Washington dealing with the 18-year old that he had to be at the Capitol for.

However, he did write a formal statement which I would like to read to you. It responds to the Technical Committee Report and not to Mr. Mayo's letter. I am sure were Mr. Mikva here he would second Mr. Mayo's remarks, particularly that in the face of such unknowns we must choose the course of caution.

The Congressman's statement begins:

"Mr. Chairman, thank you for the opportunity to appear before you this morning to respond to the recommendations of the Lake Michigan Enforcement Conference Technical Committee on Thermal Discharges to Lake Michigan.

"When I appeared before you last October, I testified that the mission and the public responsibility of this body must be to set a thermal standard and that standard should be based on the proposition that no significant thermal discharges into Lake Michigan should be allowed unless the polluters can prove beyond a reasonable doubt that no damage will be done to the lake.

"It has been my understanding that in the interim a Technical Committee was to be formed to work out a compromise thermal standard proposed by the Federal Office of Water Quality using B.t.u.'s instead of temperature. This Conference, I further understood, was to move forward and meet in February to review that implementation plan. But, Mr. Chairman, that Technical Committee Report does not move the work of this enforcement forward if it is adopted; it moves it back. It raises again the question of whether or not this Conference should set a thermal standard at all.

It is an effective bit of sabotage.

"In a momentous failure of nerve, the Technical Committee concluded that inadequate studies prevented them from fulfilling their responsibility of recommending a thermal standard. On that basis, no standards concerning water pollution should be set since every facet of water pollution suffers from inadequate research. This decision not to decide was justified by the Technical Committee Report because the existing research, although admittedly inadequate, demonstrated no damage to Lake Michigan from thermal pollution discharges. I have a hard time understanding how inadequate research can demonstrate anything.

"If the Enforcement Conference follows the recommendation of the Technical Committee not to set a standard, not to set a deadline for the use of thermal pollution abatement systems and, by default, to allow thermal pollution to continue under the guise of studying the problem, then it is not fulfilling its public responsibility and trust. It is not, in short, carrying out a fundamental pledge to set a thermal standard which I thought had been made a long time ago.

"It is unfortunate that the Technical Committee has forced us to talk again at this stage about whether or not this Conference would set a thermal standard. I urge this Conference to reject their report and move forward to the establishment of a thermal standard which will protect Lake Michigan as our region's greatest natural resource.

"If we care about keeping Lake Michigan from becoming an industrial sink, then we cannot afford, as a matter of public policy, to not set thermal pollution standards in the face of inadequate information. It is precisely because our information is inadequate that a thermal standard is necessary. If we must err, then let's err on the side of the public and set a rigid standard.

"Gentlemen, you must exercise your public trust. The lake will not wait. By rejecting the Technical Committee Report and establishing a tough thermal standard you will go a long way towards maintaining the public's faith in the capacity of its government to solve our environmental problems."

Mr. Chairman, thank you for this opportunity to read Congressman Mikva's statement. (Applause)

MR. STEIN: Thank you for your participation.

Mr. Mayo.

MR. MAYO: Mr. Chairman, we have a letter addressed to you from Senator Stevenson that I will read into the record.

"March 18, 1971

"Dear Mr. Stein:

Hon. A. Stevenson III

"I am deeply concerned about the dangers of thermal pollution in Lake Michigan. While I am well aware of the urgent need for increased electric power, I do not believe we can take chances with one of Illinois' greatest natural resources by allowing the indiscriminate installation of nuclear powerplants along its shores.

"Until sufficient data, proving beyond all doubt that heated discharges are not the cause of significant ecological harm, can be gathered from those few plants presently under construction, further construction of the many facilities currently in the planning stage should not be permitted.

"Clearly, the most immediate need is the setting of a lakewide standard that can be enforced. It is my hope that the Lake Michigan Enforcement Conference, meeting on March 23-24, will provide such a standard and that it will at least encompass the following provisions of the Illinois Pollution Control Board's tentative minimum requirements:

"Neither the bottom nor the shore shall be affected by a new heated discharge of significant proportions.

"No new heated discharge of significant proportions shall be located so as to affect spawning grounds or migration routes.

"Discharge structures shall be so designed as to maximize short-term mixing and thus to reduce the area significantly raised in temperature.

"No new heated discharge of significant proportions shall interact with any other heated discharge of significant proportions.

"Backfitting of alternative cooling devices will be required if at any time it can be shown that damage has resulted from existing or future heated discharges.

"All reasonable steps shall be taken to reduce the number of organisms drawn into or against the intakes.

"Much testing and further data are obviously needed to prove the feasibility of these guidelines and determine ways of improving discharge structure design and the interrelationship of locations. Above all, it is my strong conviction that future construction of nuclear plants without a tested lakewide standard derived from and applied to these plants presently under construction would be a grave mistake endangering the future of the lake and the lives of these millions who depend upon it for their well-being.

"Looking forward to working with you on our common goal of preserving Lake Michigan, I am sincerely, Adlai

Stevenson."

We have requests for making a statement from Mrs. Samuel Rome representing the President's Water Pollution Control Advisory Board.

Mrs. Rome.

STATEMENT OF MRS. SAMUEL ROME, MEMBER,
PRESIDENT'S WATER POLLUTION CONTROL
ADVISORY BOARD, CHICAGO, ILLINOIS

MRS. ROME: I am representing the President's Water Pollution Control Advisory Board.

The following resolution, introduced by Mr. Louis S. Clapper of the National Wildlife Federation, was unanimously adopted by members of the Water Pollution Control Advisory Board at a meeting in Washington, D.C. on February 9, 1971.

Whereas, the Technical Committee on Thermal Discharges to Lake Michigan has made confusing recommendations to the Four-State Enforcement Conference on Pollution of Lake Michigan with respect to nuclear power generating plants and the requirement that closed circuit cooling facilities be installed; and

Whereas, the Technical Committee has recommended

Mrs. S. Rome

that in-depth field and laboratory studies to determine the effects of heat upon the ecology of the lake be conducted under the guidance of a technically competent steering committee appointed by the Lake Michigan Enforcement Conference; and

Whereas, these studies should determine basic physical and biological effects of heated discharges from thermal electric power generating facilities which would apply to many bodies of water in addition to Lake Michigan;

Now, therefore, be it resolved that the Water Pollution Control Advisory Board, in regular session assembled February 9, 1971, hereby recommends to the Administrator of the Environmental Protection Agency and to the Four-State Enforcement Conference that closed circuit cooling facilities be required; and

Be it further resolved that this Board recommend in the strongest possible manner that the steering committee conducting the in-depth studies include representation of the general public and that the committee be urged to conduct public hearings in which all opinions can be expressed prior to the development of any final recommendations.

Members of the President's Water Pollution Control Advisory Board are as follows:

Dr. Melbourne R. Carriker, Director of the

Systematics-Ecology Program at Woods Hole Marine Biological Laboratory.

Mr. Louis S. Clapper, Conservation Director of the National Wildlife Federation, Washington, D.C.

Mr. William D. Farr, President of Farr Farms Company, Greenley, Colorado.

Mr. Ray W. Ferguson, Commissioner, California Water Commission, Ontario, California.

Dr. Wallace W. Harvey, Jr., who is a physician from Manteo, North Carolina.

Mr. Ralph W. Kittle, who is Vice-President of the International Paper Company, New York, New York.

Mr. Stuart M. Long, Editor of the Long News Service, of Austin, Texas.

Mr. Parker E. Miller of North Reddington Beach, Florida.

And Mrs. Samuel Rome, representing the League of Women Voters of Illinois, and speaking here on behalf of the Water Pollution Control Advisory Board.

I am sure the Board Members will be more than pleased with the letter from Mr. Ruckelshaus which was read this morning. Thank you very much. (Applause)

MR. STEIN: Thank you, Mrs. Rome. If you have an extra copy, would you give one to the reporter first?

Mr. Mayo.

MR. MAYO: We have another request for a statement on the Federal side, Mr. Chairman, from Mr. Leonard B. Young, Regional Engineer for the Federal Power Commission. Is Mr. Young available at this point?

STATEMENT OF LEONARD B. YOUNG, REGIONAL ENGINEER, FEDERAL POWER COMMISSION, CHICAGO, ILLINOIS

MR. YOUNG: For the record, I am Leonard B. Young, Regional Engineer, Chicago Regional Office of the Federal Power Commission.

I appear here to make a statement on behalf of the Federal Power Commission. I will read the statement.

The Federal Power Commission notes the reconvening of the Lake Michigan Enforcement Conference as a sequel to the Federal-State Conference of September 28, 1970, and subsequent meetings of the conferees and their technical representatives. Because of its continuing interest in the environmental questions and the related aspects of electric energy supply for the region, the Commission wishes to present further comments herewith to the Conference. In doing so, the recommendations of the Lake Michigan

Enforcement Conference Technical Committee on Thermal Discharges dated January 1971 have been received and have been studied with care.

With reference to the general question of determining appropriate standards to apply to cooling water discharges of powerplants existing on Lake Michigan and to be constructed in the period between now and 1990, we must again emphasize and confirm the data and estimates of future plant construction contained in the statement presented on behalf of the Federal Power Commission to the Conference on September 28, 1970, by Frederick H. Warren, the Commission's Advisor on Environmental Quality. These power needs continue to require the same thoughtful consideration by the State and Federal conferees in determining the best balance achievable in providing needed protection of biological systems of the lake while assuring adequate and reliable supplies of electric energy for the health and economic welfare of the region surrounding the lake.

We note from the report of the Technical Committee a number of pertinent conclusions which underlie the situation which the conferees now face:

1. After evaluating numerous studies conducted at Lake Michigan and elsewhere, the Committee states: "It

is obvious that further field studies are warranted and necessary to determine ecological impact on Lake Michigan."

2. It was the consensus of the State representatives that "their laws require controls to be set on the basis of demonstrated damage or potential damage to water uses." And, further, "... since there has been no demonstrated significant damage at existing Lake Michigan thermal plume sites from artificial heat inputs, the assignment of numerical effluent values or other engineering design requirements at this time would be arbitrary and not defensible."

3. Further, "Unlike many other waste problems, there is limited concern about persistence or buildup in the water environment or other biological magnification (such as with toxic substances) or about a direct effect upon the health or safety of man. The amount of waste heat in a body of water is always in equilibrium with the atmosphere and cessation in input will result in an almost immediate return to the natural temperature regime." Thus, "The Committee believes that the above characteristics of the waste heat program in Lake Michigan are such that they do allow a period of time for the establishment of sensible controls."

Having stated the foregoing conclusions, which appear to the Commission to be wholly consistent with the technical information so far brought forward on this complex subject, it is difficult to find a basis for the Technical Committee's further conclusion that "... unless these effects are shown definitely not to be ecologically damaging, such damage must be assumed and controls instituted accordingly." The Committee then moves from the foregoing assumption, which it acknowledges is not supported by technical data, to recommend that "... all thermal electric power generating facilities using or planning to use Lake Michigan water for the dissipation of artificial waste heat be required to have closed cycle cooling systems, or such other techniques as may be approved by the Lake Michigan Enforcement Conference, under construction by a date considered reasonable and appropriate by the conferees, unless it has been conclusively demonstrated to the Lake Michigan Enforcement Conference that ecological damage does not or will not occur from once-through cooling."

With regard to the above far-reaching recommendation, we must make a number of comments:

1. It is apparent that it would be impossible for anyone to conclusively demonstrate that ecological damage will not occur, since the statement is so written that any level of damage whatever, regardless of the extent

of damage and the amount of offsetting benefits, could be considered "damage." Furthermore, the biological factors will probably provide only a basis for reasonable judgment, which is short of conclusive demonstration.

2. We note also that the conferees have not given any significant study to the environmental consequences to the affected regions around Lake Michigan which would result from complete switchover from once-through cooling systems to the use of evaporative cooling towers or cooling ponds. These environmental consequences, of course, include not only local air quality effects but also water consumption, the use of substantial land areas, and esthetic impact wheresoever large structures are involved. It appears to us that this is an important consideration in achieving a fully balanced approach to the optimum solution for environmental protection and the provision of needed energy supplies.

3. It appears wholly logical for a committee of the conferees to continue to be responsible for the prosecution of further studies and the determination of appropriate criteria to be applied to future discharges in the lake and the evaluation of plans to meet these criteria. Nevertheless, we urge that such a committee, in keeping with the stated intent of the National Environmental Policy Act of 1969,

should be concerned with the achievement of balanced results for the protection of the "human environment." Thus we believe that such a Conference should include appropriate representation from State, regional or Federal agencies representing the user functions whose services are necessary to serve the human and industrial needs of the region. To be more specific, it would seem essential for the achievement of balanced determinations that representation on the technical committees or the Conference should be extended to appropriate agencies such as State public utility commissions concerned with electric power supply, or other officials responsible for economic development and land use planning.

MR. STEIN: May I interrupt for the purpose of clarifying the record? The representation of the Conference is set by Federal law. We don't do that.

MR. YOUNG: All right, Mr. Chairman.

MR. STEIN: Yes.

MR. YOUNG: I believe that they refer here to a committee which would oversee the prosecution of further study and the determination of appropriate criteria that would be applied to future dischargers in the lake.

MR. STEIN: I understand what you are saying, but the statements are the representation of the Technical

Committee or the Conference. Now, we are bound by the Federal law, just the way your agency is, and the representation of the Conference is set by Federal law.

MR. YOUNG: I will so advise the Commissioner.

MR. STEIN: Right.

MR. YOUNG: 4. We note that the Committee, following its recommendation, suggests three alternative methods for once-through cooling which might be "designed to avoid" any significant ecological damage. It appears to us that these three alternatives are reasonable and constructive ideas toward minimizing but not avoiding completely, ecological damage. In this connection we should like to observe that according to our estimates, the total use of cooling water by the present powerplants on Lake Michigan amounts to about 10 billion gallons per day at full load, and the estimated volume which would be required by the plants constructed in the next 10 years would be approximately an additional 10 billion gallons per day without auxiliary cooling. These daily quantities constitute about 0.04 percent of the volume of the inshore portion of the lake, indicating a dilution factor of about 2,500 to 1 each day.

In the light of the foregoing factors, we propose that the conferees consider in lieu of the recommendation of the Technical Committee a program such as the following:

1. All powerplants scheduled to come into operation between now and July 1, 1976, shall be given conditional authorization to proceed with currently designed cooling systems —

FROM THE FLOOR: Point of information, Mr. Stein. Does this gentleman work for the government or for the power companies.

MR. STEIN: Yes, he does.

I am sorry. If we are going to do this, we are not going to be able to finish. Now. I suggest you will all be given an opportunity to make your statement in order, and please give him every courtesy that I am sure we are going to give you.

This is part of the Federal presentation, and as introduced, and I guess you all know, he is a representative of the Federal Power Commission.

Would you continue, sir?

MR. YOUNG: I will begin with the first recommendation again:

1. All powerplants scheduled to come into operation between now and July 1, 1976, shall be given conditional authorization to proceed with currently designed cooling systems, which may include once-through cooling

systems, providing such systems are designed to minimize ecological damage by techniques including such as described in points 6.(a), (b), and (c) of the Technical Committee Report; with the further provisionthat if such plants as a result of prescribed pre- and post-operational monitoring show evidence of distinct ecological damage (as against certain prescribed biological population and diversity standards related to the particular location), they shall in the event of such ecological damage immediately institute measures to alter or improve the thermal discharge condition to achieve a modified biological effects standard agreed upon by the responsible environmental protection agency. A maximum of 3 years shall be allowed the operator for the completion of the required corrective measures, from the date of official notice from the responsible environmental protective agency.

2. Future powerplants scheduled for commencement of operations after July 1, 1976, may be designed according to the applicant's concept of the optimum means of meeting the prescribed tolerable ecological conditions specified in paragraph 1. above, but must be planned to make provision for modification in the cooling water facilities if as a result of further studies and operating experience between now and July 1, 1976, it becomes apparent that

such modified designs will be necessary to meet the required environmental standards.

3. All existing powerplants will be required to have in effect biological monitoring programs adequate to determine the relative level of biological damage, if any, attributable to thermal discharges, and if such damage is found to occur and to exceed substantially the biological effects standards developed as in paragraph 1 above, there shall be determined on a case-by-case basis (by joint consultation between the company and the responsible environmental protection agency) a program of the most appropriate corrective measures to be taken. Such measures may include:

(a) Continued operation with present design where the remaining life of the plant, the average annual usage, and the probable scheduling of plant operation are such that the potential costs of supplementary or modified cooling facilities would not be warranted as an offset to the limited and recoverable biological effects consequences that may be experienced.

(b) Installation of supplementary cooling facilities or modified once-through discharge facilities where warranted by the continuing life and usefulness of the powerplant and the relative biological damage consequences.

Thank you.

MR. STEIN: Thank you.

I should have asked with the previous speakers, but I will do this now: Are there any comments or questions?

I just have a few clarifying ones, and I think Mrs. Rome made this point, that we should try to get as clear as possible.

As I understand your view, that what you would suggest on each plant is that we determine whether the potential costs of cooling facilities would be warranted as an offset to biological effects that these effects are bad.

In other words, in each case, there will be a balance between biological degradation and what the cost will be.

Is that what you are saying in your proposal, sir?

MR. YOUNG: Yes, sir, of course, it would have to be a judgment.

MR. STEIN: Yes, I understand that.

Now, there is one other point that I have, and I just do this as a point of clarification. You say in point 4, it appears to us that these ideas are reasonable toward minimizing, but not avoiding completely ecological damage.

In other words, as I read what you are saying, if we adopt your proposal, we should be ready to accept or not avoid completely the ecological damage, and consider that may be something we just have to put up with. Is that correct?

MR. YOUNG: Maybe that is correct, yes, sir.

MR. STEIN: Now, you say, if we are going to make anyone put in anything, we have to show evidence of distinct ecological damage as against certain prescribed biological population and diversity standards related to the particular location. In other words, what you are saying is that we can possibly stand a little ecological damage, but for each location we have to get the numbers and the variety of the organisms limited there, and beyond that we will make a judgment that perhaps cooling has to be put in if the potential costs are not offset by these limited damages. Is that it?

MR. YOUNG: Yes, sir.

MR. STEIN: All right. Thank you.

Any other comments or questions?

Thank you very much, sir.

Mr. Mayo.

MR. MAYO: Mr. Chairman, it would be appropriate at this point to proceed with the Technical Committee

Report. Mr. Hartley will make the presentation.

MR. HARTLEY: Thank you, Mr. Mayo.

MR. STEIN: I checked the time, and I think this is about halfway through the morning, Mr. Hartley. Let's take a 10-minute recess. And all of the people who want to talk, please make arrangements with your State representative.

(Short recess.)

MR. MAYO: We have a request from Mr. Henry Conti Assistant to the Manager for Environmental Activities, Chicago Operations Office of the United States Atomic Energy Commission, to make a statement. We will ask Mr. Conti to come forward and make his statement before we hear the Technical Committee Report by Mr. Hartley.

MR. STEIN: Please identify yourself for the purpose of the record. I know you weren't here when that announcement was made, Mr. Conti.

STATEMENT OF ENRICO CONTI, ASSISTANT TO THE MANAGER FOR ENVIRONMENTAL ACTIVITIES, CHICAGO OPERATIONS OFFICE, ATOMIC ENERGY COMMISSION, ARGONNE, ILLINOIS

MR. CONTI: My name is Enrico Conti. I am

E. Conti

Assistant to the Manager of the AEC Chicago Operations Office at Argonne, Illinois. I am presenting a statement that has been prepared for the AEC.

During the past year, the Atomic Energy Commission, in connection with its developmental responsibility, has followed with considerable interest the combined efforts the Environmental Protection Agency, the four states surrounding Lake Michigan, the utility industry, universities, and consulting engineers and scientists in the development of temperature standards for Lake Michigan and an understanding of the effects and control of thermal powerplant effluents on the lake. In connection with the reconvening of the third session of the Lake Michigan Enforcement Conference, on March 23 and 24, 1971, in Chicago, Illinois, the AEC would like to submit the following statement for consideration by the conferees at this session.

The AEC has had a long-standing interest in the effects of heat upon the aquatic environment and has funded a significant portion of the Federal effort to date on thermal effects research and development. Because of our mutual interests with EPA in this area, we have endeavored to coordinate AEC efforts with various EPA programs around the country. In this regard, the extensive research program on the Columbia River has been expanded in the past two years in the cooperative studies with EPA and the Bureau of Sport Fisheries and Wildlife. More recently, the Argonne National Laboratory has initiated field and laboratory research studies to examine the effects of heated water discharges on the physical and biological systems in Lake Michigan. These studies are being carried out in concert with the Chicago Regional Office of EPA, several universities in the area, and the utilities. In addition, similar cooperative studies are now underway in the vicinity of Biscayne Bay in Florida.

In line with our studies, we have reviewed the report of the Conference Technical Committee on Thermal Discharges to Lake Michigan dated January 29, 1971. Based upon our own experience and research efforts in the field of thermal effects, we can endorse much of the assessment. We agree with the Committee's conclusions that "there has been no demonstrated significant damage at Lake Michigan plume sites from artificial heat inputs," and that "the studies which have been conducted at these plume sites are inadequate to thoroughly assess the possible effects."

However, in our opinion, there is considerable question as to the adequacy of the technical basis to support the Committee's Recommendation 4 that: "All thermal electric power generating facilities using and planning to use Lake

Michigan water for the dissipation of artificial waste heat be required to have closed cycle cooling systems -- unless it has been conclusively demonstrated that ecological damage does not or will not occur from once-through cooling." While this recommendation appears to effectively eliminate once-through cooling schemes and require alternate cooling methods, Recommendation 6 suggests that once-through cooling systems might be acceptable under certain circumstances. In our view both cooling towers and once-through cooling systems need careful examination for each individual situation.

From information provided the conferees, there are indications that properly designed intake and discharge structures for condenser cooling water have the potential to eliminate significant harmful effects of thermal releases to the receiving water body and its ecological environment. In accord with the Committee recommendations that "further field studies are warranted and necessary to determine ecological impact on Lake Michigan," we would strongly propose that comprehensive, in-depth field and laboratory studies be carried out during the next 5 years to verify the design of these effluent control facilities and also to determine the effects on the surrounding lake ecology.

These in-depth field studies should be carried out prior to the commitment of hundreds of millions of dollars for closed cycle coolings systems. There is increasing concern around the country by knowledgeable individuals that alternative cooling means may cause unacceptable air quality conditions or other undesirable environmental effects. At certain powerplant sites, wet cooling towers may have the potential of causing fogging and icing problems in the surrounding area. The design and operation of dry cooling towers has yet to be demonstrated as a practical system for large steam-electric generating plants at any site either in this country or in the world. Large cooling towers (400-500 feet high) are not attractive aesthetically along the lake front and may cause potential safety hazards to normal air transport operations. The significantly large consumption of cooling water through the use of wet cooling towers or spray canals as opposed to once-through systems should be considered.

While it may be extremely difficult, or impossible, to "conclusively demonstrate" that ecological damage does not or will not occur from once-through cooling, we strongly endorse the Committee recommendation that comprehensive, in-depth field studies be carried out to determine the effects of thermal releases on the surrounding lake ecology.

It may be of interest to this conference proceedings, that a recently published Argonne report which analyzed the impact of man-made thermal discharges into

Lake Michigan from artificial heat loads (nuclear and fossil-fueled power generating facilities -- both existing and proposed -- and steel plants) has concluded that increase in lake temperature and water loss due to evaporation as a result of these heated discharges are "negligible and will continue to be so for the rest of this century." The daily addition from existing and proposed nuclear plants to the lake's heat input represents about 0.1 percent of the average natural daily warming from the sun. The report concludes, however, that while the average lake-wide effects of man's thermal effluents may be small, it does not automatically follow that local thermal effects, and the short and long term meteorlogical effects will also be negligible. More detailed information is needed on these local effects, lake circulation patterns and details of heat transfer between air and water, all areas that would be included in the in-depth field studies which have been recommended by the Lake Michigan Technical Committee.

In summary, the AEC endorses the Lake Michigan Conference conferees' objectives of establishing meaningful temperature standards for the lake and its recommendation for comprehensive, in-depth field studies to determine the effects of thermal releases on the surrounding lake ecology. We suggest a broader-based participation in the development and guidance of these studies than just the EPA, the

Bureau of Sport Fisheries and Wildlife, and the surrounding States. Experience which has been obtained in the on-going cooperative study of the Chesapeake Bay during the past year would be of value in the planning and conduct of the Lake Michigan study. EPA, the Federal conferee in the Enforcement Conference is participating in the Chesapeake Bay Study.

The opportunity to share these thoughts on the Technical Committee's report is appreciated, and we hope to continue to actively participate with EPA and the surrounding Lake Michigan States in developing the necessary technical data as a basis for establishment of reasonable water quality standards for Lake Michigan.

MR. STEIN: Thank you, Mr. Conti.

Are there any questions or comments? I wonder if you would clarify one point for me? I didn't quite see it in your paper, although I was looking for the answer to this if possible.

You talk in terms of in-depth studies, and I think that is what a lot of people have recommended. The question I think that is going to face these conferees is whether when we have existing or proposed plants, we permit these plants to go in with once-through cooling while we have these proposed studies.

Do you care to comment? What is your view on that?

MR. CONTI: Was your question whether the presently proposed plants should be allowed to go in while the study is being performed?

MR. STEIN: That is correct.

MR. CONTI: Yes.

MR. STEIN: Right, that is the view — with once-through cooling?

MR. CONTI: Yes, the answer is yes.

MR. STEIN: Right. Thank you.

Any other questions or comments? Thank you very much, Mr. Conti.

MR. MAYO: Mr. Chairman, we will proceed, at this point, with the presentation of the Technical Committee Report by Mr. Hartley.

MR. STEIN: We have had the criticism of the report before it came up. I guess this puts you in a peculiar position, Mr. Hartley —

MR. HARTLEY: Yes, it does.

MR. STEIN: — but go ahead.

MR. HARTLEY: Thank you, Mr. Mayo.

STATEMENT OF ROBERT P. HARTLEY, DIRECTOR, OFFICE OF ENFORCEMENT AND COOPERATIVE PROGRAMS, FEDERAL WATER QUALITY ADMINISTRATION, DEPARTMENT OF THE INTERIOR, CHICAGO, ILLINOIS

MR. HARTLEY: Mr. Chairman, conferees, my name is Robert Hartley. I am with the Environmental Protection Agency and Chairman of the Enforcement Conference Thermal Technical Committee.

At the October 29, 1970, Executive Session of the Four-State Enforcement Conference on Pollution of Lake Michigan, held at Grand Rapids, Michigan, several proposals were brought forth for the consideration of the Conferees.

The Department of Interior had earlier proposed to the Conference as a policy recommendation the following:

"The minimum possible waste heat shall be added to the waters of Lake Michigan. In no event will heat discharges be permitted to exceed a 1° F. rise over ambient at the point of discharge. This will preclude the need for mixing zones."

The Illinois Conferee proposed the following:

"There shall be no heat from man-made sources permitted to enter directly or indirectly into Lake Michigan or its tributaries in any discharges having a rate greater than 50 gallons per minute. This rate relates primarily to cooling water from watercraft."

The Michigan Conferee indicated that Michigan would:

"... support a moratorium for five years for further construction of thermal power plants on Lake Michigan pending findings from intensive before and after studies at the Palisades and Cook plants under outstanding (Michigan Water Resources) Commission orders; such studies to include investigations of effects on fish larvae on their passage through plants in the cooling waters; that this position does not change the present Order provisions that at any time injury from thermal discharge is detected, existing Orders will be reviewed and modified as necessary to prevent such injury; and that this position will guide Executive Secretary Ralph Purdy in Lake Michigan enforcement conference deliberations..."

The Federal Conferee offered the following proposal:

1. "Establish a level of thermal input in B.t.u./hr. from individual man-made sources below which there would be no concern for adverse impact on the lake environment or established beneficial uses of lake waters, recognizing that in special circumstances some control may be necessary because of unique factors at the site of the discharge.

2. "Establish above this level a range of thermal

input in B.t.u./hr. within which there is concern for possible impact on the lake environment or established beneficial uses of lake waters unless control is exercised over the manner in which the discharge takes place. Such controls may be in the form of a prohibition of shoreline discharges and requirement for outlet works that will discharge at a minimum distance from shore and in a minimum depth of water (whichever is the lesser) keeping the heated water off the lake bottom and designed to restrict the temperature of the discharge to a range of temperature rise above the natural temperature of the receiving waters.

3. "The upper level of this range to represent a level of thermal input that could not be exceeded for any given man-made installation.

4. "Apply this upper level as the maximum thermal input limit that would be permitted for any given reach of shoreline (perhaps 5 miles) from all sources, recognizing that natural heat input from tributary streams may exceed this limit at times.

5. "Consider the applicability of these limits on man-made thermal discharges to the lower reaches of tributary streams.

6. "Consider the justification for applying the proposed limitations to thermal discharges from municipal

treatment plants."

The Conferees agreed that the proposal presented by the Federal Conferee offered a reasonable conceptual approach and was worthy of an attempt to use it as a basis for control regulations. As a result the Conferees authorized the formation of a technical committee to specifically review that proposal and if possible to recommend suitable numerical limits to be included in the proposal. The technical committee was to be comprised of representatives designated by the States of Illinois, Indiana, Michigan and Wisconsin, the U.S. Environmental Protection Agency and the U.S. Bureau of Sport Fisheries and Wildlife. Members of the technical committee are:

Robert P. Hartley, U.S. Environmental Protection Agency, Chairman.

Howard Zar, U.S. Environmental Protection Agency, Alternate.

Yates Barber, U.S. Bureau of Sport Fisheries and Wildlife.

Thomas Edsall, U.S. Bureau of Sport Fisheries and Wildlife, Alternate.

Carl T. Blomgren, Illinois Environmental Protection Agency.

James C. Paccione, Illinois Environmental Protection

Agency, Alternate.

Oral H. Hert, Indiana State Board of Health.

Carlos Fetterolf, Michigan Water Resources Commission.

F. B. Frost, Michigan Water Resources Commission, Alternate.

Jerome McKersie, Wisconsin Department of Natural Resources.

The committee met in Chicago November 10, November 24, December 7-8, December 16, and December 22, 1970, and January 12, 1971.

The committee assumed that most of the information available as a design basis for thermal regulations had been presented at the Enforcement Conference workshop September 28 through October 2, 1970. Unfortunately the information presented at the workshop consisted primarily of conflicting opinions by many experts as to the effects of thermal discharges but contained little conclusive data. The committee evaluated numerous studies conducted at power generating stations at locations other than Lake Michigan and determined that this information is not sufficiently thorough or applicable to Lake Michigan conditions. It is obvious that further field studies are warranted and necessary to determine ecological impact on Lake Michigan.

R. P. Hartley

The technical committee, after careful consideration of the Federal Conferee's proposal and several variations of the concepts therein, agreed that, although the concepts have merit, a lack of specific data and an abundance of general contradictory information on the effects of thermal inputs prevents assignment of specific numerical input limits at this time. It was the consensus of the State representatives that it would be their responsibility to enforce such limits and their laws require controls to be set on the basis of demonstrated damage or potential damage to water uses. The committee recognizes the value of receiving water temperature standards but, since there has been no demonstrated significant damage at existing Lake Michigan thermal plume sites from artificial heat inputs, the assignment of numerical effluent values or other engineering design requirements at this time would be arbitrary and not defensible. The same reasoning applies, of course, not only to the proposal of the Federal Conferee but also to the proposals of the Illinois and Michigan Conferees and the earlier proposal by the Department of Interior. However the committee unanimously expressed concern that as yet undemonstrated damage to the ecology of Lake Michigan may be occurring or might occur with increasing inputs of waste heat. The committee thus felt an obligation to consider other approaches to thermal input regulation.

The committee examined several remedies for ecological damage including closed cycle cooling, and ideas about multi-port, high speed discharges. Because of the sparsity of information available to it, the committee considered it inadvisable to recommend the imposition of specific engineering requirements for cooling or discharge systems which would possibly appear inadequate or damaging in themselves in a few short years.

Unlike many other waste problems, there is limited concern about persistence or buildup in the water environment or other biological magnification (such as with toxic substances) or about a direct effect upon the health or safety of man. The amount of waste heat in a body of water is always in equilibrium with the atmosphere and cessation in input will result in an almost immediate return to the natural temperature regime. The behavior of waste heat in Lake Michigan is also significantly different than it is within the predictable confinement of a flowing stream.

The committee believes that the above characteristics of the waste heat problem in Lake Michigan are such that they do allow a period of time for the establishment of sensible controls. During that time however the committee urges that the selection and development of new sites for facilities utilizing Lake Michigan waters for waste heat dissipation be held in abeyance pending completion of adequate field studies of thermal effects. In fact the committee seriously considered several proposals, such as stopping heat input at the presently existing level or at the level existing or now under construction with limitations as to maximum allowable input from a single source. Each of the proposals was tied to a time required to complete studies. The moratorium proposal has the disadvantage of not being likely to lead to controls on existing discharges.

The committee believes that the most important effects of waste heat are local, lying mainly at or very near the heat source. The most obvious effects will be to organisms caught up in tremendous volumes of water passing through cooling facilities and immediately subjected to large temperature rises and other physical stress. Of almost equal importance would be the fate of additional organisms entrained within the plume in the immediate area of the discharge. Only limited information is available on the numbers of organisms which are affected and whether they are in the critical region long enough for the effects to be significant. It appears to the committee that, unless these effects are shown definitely not to be ecologically damaging, such damage must be assumed and controls instituted accordingly. One alternative to prevent damage is to greatly reduce the volume of lake water used.

The committee is particularly concerned also about the behavior of waste heat inputs in winter, on which information for Lake Michigan is virtually absent. Bottom layering of warm water might occur over relatively large areas, having its chief effects on bottom fauna and the disruption of fish reproduction. If such occurs, the reasonable control course is again to reduce greatly the amount of waste heat input.

The committee has taken the approach in the following recommendations that ecological damage must be assumed until it is shown otherwise. It has also taken an approach that it hopes will tend to force adequate field and laboratory research into an area where rhetoric is profuse but information for judgement is either sorely lacking or strikingly contradictory.

Conclusions and Recommendations

1. The committee recognizes that existing water pollution control laws in the Four Lake Michigan States permit the use of Lake Michigan for domestic and industrial water supplies, for the propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial, recreational, and other legitimate uses including their use in the final

distribution of the waterborne wastes of our economy. The committee further recognizes that all Four States can order the abatement of demonstrated pollution resulting from thermal discharges as well as other sources. The existing laws also permit action to prevent pollution should there be reasonable assurances that such pollution will occur. The committee has agreed that there has been no demonstrated significant damage on Lake Michigan plume sites from artificial waste heat inputs, however, it is the consensus that the studies which have been conducted at these plume sites are inadequate to thoroughly assess the possible affects.

2. The committee has determined from knowledge of (a) thermal and biological principles, (b) field and laboratory studies of Great Lakes fish and other organisms, and (c) field and laboratory studies on other areas, that the use of Lake Michigan waters for the dissipation of waste heat may be damaging to the ecology of the lake. Of particular concern is the damage that may be occurring to phytoplankton, zooplankton, benthos and to egg, larval, and juvenile life stages of important fish species. The committee believes that local adverse effects that may occur can be corrected by the reduction of the use of Lake Michigan waters for waste heat dissipation.

3. In reviewing the waste heat burden to Lake

Michigan the committee has concluded that discharges of waste heat from controllable sources other than thermal electric power generating facilities are at present a relatively small part of the total waste heat discharged to the lake. Therefore, in the judgement of the committee, control of heat from such lesser sources as vessels, water treatment plants, municipal sewage treatment plants and industrial installations does not require waste heat control measures at this time.

4. The committee therefore recommends that all thermal electric power generating facilities using or planning to use Lake Michigan water for the dissipation of artifical waste heat be required to have closed cycle cooling systems, or such other techniques as may be approved by the Lake Michigan Enforcement Conference, under construction by a date considered reasonable and appropriate by the Conferees, unless it has been conclusively demonstrated to the Lake Michigan Enforcement Conference that ecological damage does not or will not occur from once-through cooling.

5. The committee further recommends that in-depth field and laboratory studies to determine the effects on the ecology be conducted under the guidance of a technically competent steering committee appointed by the Lake Michigan Enforcement Conference. The studies should determine the

physical and biological effects on Lake Michigan of heated discharges from thermal electric power generating facilities and the affects on organisms in the cooling water passing through these facilities.

6. The committee recognizes that facilities with once-through cooling may possibly be designed to avoid ecological damge by:

(a) Discharging far enough offshore to prevent the thermal plume from reaching the shoreline.

(b) Designing the discharge structure to prevent the thermal plume from reaching the lake bottom.

(c) Designing plant piping and pumping systems to minimize physical damage to entrained aquatic organisms.

7. The committee recommends that geographic areas affected by thermal plumes from artifical waste heat discharges not overlap or intersect.

8. The committee recognizes the possible detrimental effect on various aquatic organisms resulting from the use of chlorine or other chemicals in the cooling water. The committee recommends that all new power facilities using Lake Michigan water be required to incorporate mechanical cleaning rather than chemical into plant design. All existing facilities should be required to install mechanical cleaning devices on condensers as improvements or modifications

are made to equipment.

9. The committee has limited evidence that there may be physical damage to phytoplankton, zooplankton and fish at intake structures and during the pass through the cooling system. The committee anticipates that studies will demonstrate damage to the above organisms and therefore recommends that future intake structures be designed and located to minimize entrainment and thus avoid possible destruction of these organisms.

10. The committee has concerned itself with the loss of benthos, phytoplankton, zooplankton, and fish through the intakes of various industrial and municipal water supplies. The committee suggests that each State conduct studies under the guidance of the technical steering committee of the passage of organisms into these facilities to determine if there is a significant loss.

11. The committee recommends that all thermal generating facilities be required to record intake and discharge flows and temperatures continuously and to make these records available to the regulatory agency upon request.

MR. STEIN: Thank you, Mr. Hartley.

Are there any comments or questions?

Mr. Purdy.

MR. PURDY: Mr. Hartley, on the matter of mechanical cooling devices — the cleaning devices — is this limited to the once-through system or does that also apply to the closed cycle system, and if so are there mechanical cleaning devices for, say, slime control, and so forth, on the cooling towers?

MR. HARTLEY: It is my understanding that it applies to all condenser cooling facilities, cleaning within the condenser. That would include closed cycle cooling.

MR. PURDY: But there would still need to be, say, some sort of — or very probably need to be some sort of control for growths on the surfaces of the cooling towers. Would this not be correct?

MR. HARTLEY: That is quite possible.

MR. PURDY: But if you have to use chemicals there, what is the purpose of limiting the use of chemicals within the condensers?

MR. HARTLEY: You have a very good question. (Laughter)

MR. MAYO: Mr. Purdy, I think we are obliged here, to the extent that we have confidence that mechanical cooling means are practical for the condensers, to use those facilities and minimize the need for additives. We just take whatever opportunities are available to us technologically to achieve the cleaning requirement, but at the same time minimize those additives which in themselves present potential problems.

MR. PURDY: I understand this, Mr. Mayo, for the once-through system. But for the closed cycle system where a great portion of water will be recirculated, it seems to me that the detention time and continued exposure of anything entrained in this recirculated flow to elevated heat levels will damage the entrained organisms to the point of where it doesn't make any difference whether you use a chemical additive or a mechanical cleaning device on the closed-cycle system. Plus the fact that when you get out into the cooling tower and the recirculation there, it is my understanding from cooling tower use now that additives have to be used for slime control there. And that, as such, I am wondering what the purpose is of the mechanical cleaning on the closed cycle system.

MR. MAYO: Let me make this point.

MR. STEIN: Why don't we let Mr. Hartley answer? Mr. Hartley, I don't know whether you want to answer the question or not, but do you want to respond to this for yourself or the Technical Committee?

MR. HARTLEY: Well, I think Mr. Purdy has made a very good point, and I think it was the thought of the Technical Committee, at the time — and I think they were thinking particularly of once-through cooling, and perhaps had not considered closed-cycle cooling in this respect.

MR. STEIN: Mr. Mayo.

MR. MAYO: By observation, it would seem to me, Mr. Purdy, that cooling towers, of course, are not the only alternative to once-through cooling. Wet cycle recycling would be accomplished by means other than cooling towers. And under those circumstances where there would not need to be any additives for antifouling purposes,then certainly the use of mechanical devices in the condensers would seem most appropriate. However, I think there would be a need to be alert to the fact that if antifouling additives are needed in taking care of this kind of a problem where a cooling tower might be employed, then certainly we need to be attentive to the opportunity for that additive to take care of the condenser problem as well, and not make the requirement any more burdensome than it would have to be.

MR. PURDY: Well, again, it seems that on the closed cycle, that the repeated long detention times and continued exposure to elevated heat levels on the closed cycle makes the damage to the organism somewhat a moot question.

MR. STEIN: Is this a — are we in agreement on that or not?

Let me pose the question this way: I assume the addition of chlorine or another material as an antifoulant is considered undesirable because of its effect on the zooplankton, phytoplankton, and the small fishes going through the system, not because of its effect on the discharge to the lake. Is that correct?

MR. MAYO: Well, depending upon the character of the additives, Mr. Chairman.

MR. STEIN: That is right.

MR. MAYO: They may, in fact, represent a water quality problem in the receiving water.

MR. STEIN: Well, if there is a water quality in the receiving water that is one question. But I think what Mr. Purdy was saying: If the purpose of this is to prevent the demise of these organisms going through the plant, and if you have a closed system and you are going to create some lethal pressures anyway, you can only be killed once. What's the point in restricting this?

MR. MAYO: Mr. Purdy's comment was directed toward the reasonableness of requiring mechanical cleaning in the condenser versus using additives in an instance where these additives are required for other antifouling purposes and, at the same time, take care of the antifouling requirements in the condenser. I think he asked the question, aside from the point of whether or not the additives, as such, would be of consequence to the organisms that are going through the plant.

I interpreted Mr. Purdy's remark to be related to the general character of the water that would be recycled and the general character of the blowdown that would come as a consequence of using the antifouling materials.

MR. STEIN: Well, I am trying to see if there is agreement or disagreement between you. The issue here is: Let us suppose we have a closed cycle tower system. Let us suppose that a chemical has to be used for an antifoulant to keep those cooling towers working. Would you then say that for the condensers you had to use mechanical cleaning?

MR. MAYO: Probably not as long as we had the opportunity to control the character of the water that was discharged later on.

MR. STEIN: All right.

Mr. Purdy, do you care to comment further?

Mr. Dumelle.

MR. DUMELLE: Mr. Hartley, I just wanted to ask you: Since the Committee report was done in January and it has been about 2 months since that time, has any new information come to your notice other than what we have had presented to us at the hearings, as to significant damage, or will Dr. Mount be speaking to this?

MR. HARTLEY: Specifically none to me. I think that Dr. Mount will cover this quite adequately particularly with respect to fish.

MR. DUMELLE: All right. Thank you very much.

MR. STEIN: Mr. Frangos.

MR. FRANGOS: Yes.

Mr. Hartley, I am wondering if you could review for me the principal concern in the requirement that there not be a physical intersection of plumes.

MR. HARTLEY: If I understand the question correctly, you are asking what is our concern for intersection of plumes?

MR. FRANGOS: Yes.

MR. HARTLEY: Well, I think there are several reasons. If plumes do intersect, then that means that a far greater area — a continuous area is affected by heated water. This essentially limits the area from which organisms in the near shore area can escape the heated water.

I think the idea here is that if they do overlap, then we are getting to a point where we are approaching continuous, let's say, excess temperature in the near shore zone. Does that give you any idea of what we are talking about?

MR. FRANGOS: Yes, but I think, wouldn't the concern depend upon the character of the plume, the location, how the intersection is made? For example, you might have something in the area of, let's say, a tenth of a million B.t.u./hour, and let's assume you had two of those. You might very well treat those as -- again, depending upon the configuration and the physical characteristics -- as a single source.

MR. HARTLEY: You are saying if you have two small discharges which intersect, would that be of concern?

I suspect not, if they are very small. The Technical Committee, I think, recognize the fact that there are small heat discharges which do not require regulation, and I suspect that this would fall under this category. If they are very small and adjacent, I suspect you could assume that they are one for all practical purposes.

MR. FRANGOS: Okay. Thank you.

Mr. Chairman, I would just like to perhaps, at this time, commend the Technical Committee on the work that they have done on their report, and if indeed the results and the recommendations may not be totally responsive to some people, and perhaps there may be some inadequacies in the technical report, I think that this reflects the fundamental problems and difficulties that we have been faced with at this Conference, grappling with this thermal question. And I think we ought to understand — at least I understood — that the conferees viewed this as a Technical Committee, and their charge was to review the voluminous data that was presented to the Conference over a span of some 5 days.

Again, I think it just restates the two fundamental problems as we see them: 1) the lack of technical certainty in either way, whether there is damage or there is not, and 2) I think some rather serious questions in terms of the legal authority and scope of this Conference or outside of the Conference when you are dealing with, I think, subtle ecological problems of this nature.

So I would think that they have indeed made a contribution to the Conference, that they have been very helpful. I don't think that their mission or their charge was to determine public policy; rather they were to review the technical data, submit it to the conferees, and I believe that our principal charge is to come up with some recommendations that do determine public policy.

MR. MAYO: I am glad to have Mr. Frangos' comments, Mr. Chairman. The assignment to the Technical Committee was certainly a burdensome one and an onerous one in terms of the subject matter and the magnitude of the material that they had a responsibility to address in making their appraisal, and in terms of the sensitivity of the subject matter and the sensitivity of the relationship between the State and the Federal Governments in attempting to put together a report that represented some form of a consensus of the technical people involved.

To that extent, I think the Committee is entitled to recognition for the very sincere and very serious effort that they put forth. This is in spite of the fact that there has been a fair amount of criticism directed at the report and, as a consequence, I suppose by inference at the Committee members themselves.

MR. STEIN: I don't think so. As a matter of fact, I think the record today speaks for itself on the Committee report. I think the Committee did a commendable job in getting this material together under its deadline. But the criticism — we had the report today. No one agreed with it. Some people thought it was too lenient; some people thought it didn't go far enough; and other people thought it was too strict.

Now, I might say that as far as I can see this has served an immensely useful purpose in clearing out a lot of the underbrush in getting at the problem. But I don't see that this report that the Committee put forth is in any different shape than say a proposal that was put forth at Grand Rapids, or proposals put forth at previous conferences or at the workshops, by industry, conservationists, governmental groups. They were all received with the same kind of reception that this Technical Committee Report was. Practically no one agreed with what anyone put forward.

There were only two kinds of judgments -- one group of people said it was too strict, and the other said it was too lenient.

Now, if we are going to criticize this Committee for getting the same kind of reception everyone else has had with this proposal, I don't think that is a criticism. I think they have done a good job. (Applause)

Are there any other comments or questions? If not, thank you very much, Mr. Hartley.

Mr. Mayo.

MR. MAYO: Mr. Chairman, in keeping with the recommendations contained in Mr. Ruckelshaus' letter, we wish to offer for the consideration of the conferees at this time some proposed Lake Michigan thermal discharge regulations. The proposal will be presented by Mr. Dale Bryson.

STATEMENT OF DALE S. BRYSON, DEPUTY DIRECTOR,
OFFICE OF REGULATORY PROGRAMS, WATER QUALITY OFFICE, EPA,
REGION V, CHICAGO, ILLINOIS

MR. BRYSON: The proposed Lake Michigan Thermal Discharge Regulations are in two parts, part A and part B:

A. Applicable to all waste heat discharges to Lake Michigan except those occurring from municipal waste treatment, water treatment plants, and vessels.

1. At any time, and at a maximum distance of 1,000 feet from a fixed point adjacent to the discharge, the receiving water temperature shall not be more than 3° F. above the existing natural temperature nor shall the maximum temperature exceed those listed below, whichever is lower:

	Surface 3 feet
January	45°
February	45°
March	45°
April	55°
May	60°
June	70°
July	80°
August	80°
September	80°
October	65°
November	60°
December	50°

Determination of compliance with the above limits shall be made by the State regulatory agencies and EPA by June 30, 1971.

2. Water intake shall be designed and located to minimize entrainment and damage to desirable aquatic organisms. Requirements may vary depending upon local situations but, in general, intake should have minimum water velocity, shall not be influenced by warmer discharge waters, and shall not be in spawning or nursery areas of important fishes. Water velocity at screens and other exclusion devices shall also be at a minimum.

3. Discharge shall be such that geographic areas affected by thermal plumes do not overlap or intersect and shall not affect spawning or nursery areas of important fishes.

4. Fouling problems shall be solved by the use of inert mechanical devices. In exceptions where antifouling chemicals must be used to supplement mechanical devices or as an interim measure, the concentrations at the point of discharge shall not exceed the 96-hour TL_m concentration for fishes and important fish food organisms.

5. Investigations shall be carried out by the discharger at each intake and discharge site for those facilities discharging more than a daily average of 2 billion B.t.u./hour. Such investigations should place emphasis on the determination of direct effects of intake and discharge upon the fishery resource of Lake Michigan. All investigations shall be conducted with frequent review and guidance from the State regulatory agencies and EPA.

6. Should information at any time become available from these studies or other sources which indicates to the regulatory agencies that any cooling water use has caused or may reasonably be expected to cause ecological damage or violate item 1 above, immediate necessary steps will be taken to restrict this use.

7. In order to provide for timely construction of auxiliary cooling systems, in the event they become necessary, each facility discharging more than a daily average of 0.5 billion B.t.u./hour will begin immediately to prepare plans for alternative methods of waste heat disposal, including closed cycle cooling. Preliminary plans shall be completed by December 31, 1971, for facilities now in operation. More than one plan may be appropriate.

8. All facilities discharging more than a daily average of 0.5 billion B.t.u./hour of waste heat shall continuously record intake and discharge temperature and flow and make those records available to regulatory agencies upon request.

B. Applicable to all new waste heat discharges exceeding a daily average of 1/2 billion B.t.u./hour, except those occurring from municipal waste treatment plants, and vessels, which have not begun operation as of March 1, 1971, and which plan to use Lake Michigan waters for cooling:

1. Discharges and water use shall be limited to that amount essential for makeup and blowdown in the operation of a wet, closed cycle cooling facility.

2. New applications for powerplant construction permits must be submitted in the context of a regional

power expansion plan and must provide evidence of participation in site planning by the State and Federal regulatory agencies. Public notice of proposed sites should be given at least 5 years in advance of construction.

MR. STEIN: Are there any questions or comments?

MR. PURDY: Mr. Stein, from the standpoint of the monthly temperature recommendations now, under A. 1., can we of the States now assume that this is a fixed and final recommendation? And the reason that I ask this is that roughly about 1 year ago, I think on March 16 of 1970, we held public hearings to adopt monthly maximum temperature restrictions on Lake Michigan, based upon recommendations that had been made to Mr. Poston by Dr. Mount, and although they are somewhat different than these presented today, they were very close, and yet we went a long ways away from that in the intervening 12 months and are now back, and I would hope that this now represents a fixed and final recommendation that we can act on.

MR. STEIN: Do you want to comment on that?

MR. BRYSON: These specific numbers will be addressed to by Dr. Mount in his presentation shortly, Mr. Purdy. So I feel that these are the numbers that EPA feels are values that should be associated with Lake Michigan.

MR. PURDY: All right.

MR. STEIN: Maybe you want to defer that, Mr. Purdy. We do have a committee established now, because in administrating this, I do believe we have a need for some fixed numbers not only here but throughout the country.

We have Dr. Mount, who is in charge of our freshwater standards in Duluth, Dr. Tarzwell in charge of salt water standards for fishes and other aquatic organisms in Narragansett, and they are on the committee as well as Mr. Yates Barber in the Department of Interior, Fish and Wildlife Service, and Mr. Frank Rainwater, Engineer of our Corvallis lab, who specialized in the engineering aspects of cooling.

Now, I think when Dr. Mount and these others come up to do this, as I understand it, this is the composite view of this committee agreed to by the committee; and as far as I am concerned, we are pretty stable on this, and we have established these numbers after consulting with our experts on a nationwide basis.

Are there any other comments or questions?

MR. MAYO: Yes, Mr. Chairman, with respect to item 7 on page 2.

The item addressed itself to a requirement that preliminary plans be completed by December 31, 1971, for facilities now in operation. In the context of being prepared to address each installation to the possibility for some remedial action to take place, I think it would be most appropriate for the conferees to address themselves also to a date by which any necessary remedial action would have to be accomplished. We have done this in a variety of other circumstances in connection with the Conference activities, and it would be appropriate here for the conferees to also address themselves to a date certain for the accomplishment of the needed remedial action.

MR. STEIN: Is that agreeable?

I think that probably is essential because I noted that too. I think the point is that if your proposal is to close the circuit on that and have a closed loop system, you have a proposal for plants that are not already in operation. But I think we should consider a timetable for putting in remedial facilities for plants which are now operating, which you would consider by whatever data you did -- if December 31, 1971 is the data -- to need facilities. We should have a timetable on that.

Mr. Purdy.

MR. PURDY: Mr. Stein, I guess now -- or Mr. Mayo, the question of how A. 7. fits in with A. 1., and does this mean that you would move forward on the closed cycle cooling for any existing facility that exceeds a half billion B.t.u./hour even though it met the standard adopted of 1,000 feet with a Delta-T of not greater than 3° F.?

MR. MAYO: No, I think perhaps you have missed the relationship between those two points, Mr. Purdy.

Item 7 directs itself to the timely construction of auxiliary cooling systems in the event they become necessary in terms of not being able to meet A. l. and it speaks in terms of the development of preliminary plans by December 31, 1971, for each facility discharging more than a daily average of a half a billion B.t.u./hour.

So what it says is that the discharger, whose average daily discharge is more than a half a billion B.t.u./hour, it would be an automatic requirement for them to develop preliminary plans for any auxiliary cooling facilities should it be found that they are not in compliance with A. l.

MR. MILLER: Mr. Chairman, I have a question of how you relate item 5, which has a daily average of 2 billion B.t.u./hour, where you are going to make investigations of a discharger at the intake of the discharge, and then you require it if it is over 1/2 billion B.t.u./hour.

Should 5 be a half of a billion B.t.u./hour?

MR. MAYO: No, the distinction between 7 and 5 is one that relates to the magnitude of the discharge, and the considered judgment that when you are in the range of 2 billion B.t.u./hour, that there be investigations of some substance with regard to those discharges.

MR. MILLER: Yet, we apply it to all those that are over a half.

MR. MAYO: In item A. 1., that concluding sentence: Determination of compliance with the above limits shall be made by the State regulatory agencies and EPA by June 30, 1971.

For all dischargers whose heat discharge is half a billion B.t.u./hour, we would say, because of the prospects for not being able to meet A. 1., we think it would be reasonable for all of those dischargers to develop preliminary plans by December 31, 1971, should it be found that auxiliary cooling systems would be necessary.

But for those discharges in excess of 2 billion B.t.u./hour that there be special investigations carried out. Such investigation should place emphasis on the determination of direct effects of the intake and discharge upon fishery resources of Lake Michigan. So we are distinguishing in terms of magnitude with respect to the intensity of investigation, but taking all of those over a half a billion B.t.u./hour and requiring them to develop at least preliminary plans. So that, should it be determined that they are not in compliance with A. 1., that the preliminary planning element would already have been accomplished by December 31, 1971.

MR. CURRIE: Mr. Chairman, at what date is it contemplated under paragraph B that facilities now under construction will have closed cycle cooling?

MR. STEIN: By the way, Mr. Currie, I think that is a pertinent question and really one we have to answer. As far as I am concerned, we are going to pursue that and pursue it hard.

We have two questions here: 1) whether plants under construction or not started yet have to have this closed cycle system before they begin operation; 2) where you determine that existing plants need cooling facilities, how long we are going to give it. I think these are the essentials of the time schedule that have to be met.

Now, do you want to take a crack at what Mr. Purdy asked for?

MR. BRYSON: Our intent at this is to look at each one of these facilities on a case-by-case basis with our technical experts to find out what is a reasonable amount of time in which it is going to require to either backfit these facilities or construct the necessary facilities for ones that are not under construction right now. So it will be on a case-by-case basis that we would look to the facilities.

MR. CURRIE: Is it contemplated that you may want to keep some of them closed down until they have installed these facilities?

MR. BRYSON: I think that is a judgment we are going to have to make when we look at the individual plant, and the circumstances around that individual plant.

MR. MAYO: I wouldn't rule that out on the basis of a case-by-case appraisal.

MR. STEIN: Let me get back to Mr. Currie's question on this. In other words, what you are saying is that for a plant under construction, you are not proposing necessarily that we have a date that they are going to comply, nor are you saying you won't permit them to go unscreened without having these facilities in. You are saying you are going to review that on a case-by-case basis, and you are going to come up with two judgments on a case-by-case basis: For a plant that is under construction or which hasn't started yet, that they are going to have a closed cycle or its equivalent, but you are not going to say when they are going to have to have it finished. Nor are you going to say whether a plant can open without it being finished or not, except on a case-by-case basis.

Is that what you proposed?

MR. BRYSON: I think the conferees could establish an outside date if necessary. The thing is that these plants have various complexities due to their size, due to the physical location of the facility, or planned location, and I think to generalize for this broad range of possibilities is impossible.

MR. STEIN: Have we generalized for the steel mills and the oil companies up here on completion dates or not? I think they were fairly complex operations.

MR. MAYO: I think your point is well taken, Mr. Chairman, in terms of seeking to establish an outside date for the achievement of compliance with this closed cycle cooling requirement. I think your point is well taken.

MR. STEIN: Maybe we can think of that, but let's get back to Mr. Currie's point which I think is an essential point, too.

That is, whether with a plant under construction that we are going to contemplate, if we have this outside plant, letting that plant open without having the facilities in place and in operation. Is that contemplated in your proposal?

MR. MAYO: We would see the possibility for a plant that is essentially ready to go into operation and for which the whole question of backfitting needs not to be addressed, that it might not be unreasonable for that circumstance to permit operation for a specific limited period of time. We are faced with the possible parallel of the situation that exists at Palisades, where in substance there has been an agreement between the power company and the intervenors in the context of the AEC technical committee requirements, whereby the plant could go in operation and that within 32 months, in terms of that agreement, the discharger would be required to be on line with backfitted cooling facilities.

To the extent that we might have a close parallel to that situation, which may not be unreasonable, it may not be unreasonable to use the same solution.

MR. STEIN: Well, we can simplify this if you are talking in terms of your outside date or your date in each one, whether you stated 2 months, 3 years or 2 years. I just pose this question. If you can say that with plants under construction that these plants will be or will not be permitted to go into operation as long as they meet -- let's assume you are making judgments that they meet to go in operation -- as long as they meet the State requirements, then your limited time takes care of itself because you have already set the limits.

Now, I think this is a very significant question that Mr. Currie asked. I base this not on a question of ours -- of one against the other -- but if you have a question of getting sufficient power in the area and if a plant doesn't come on line when someone figures it should come on line, I think the conferees have to consider that question very, very carefully.

MR. MAYO: I think we should set a date certain for the accomplishment of the corrective backfitting operations that would be required under item B; and the period of somewhere between 32 months and 3 years, if this is reasonable in terms of our understanding of the problems of design and construction, might be certainly worth very specific discussion on the part of the conferees.

MR. STEIN: Well, why don't you think about that possibly during lunch. Again, let me go back. I think in dealing with Mr. Currie's point, assuming you accept this -- and I am making no assumption now; I am just pursuing this and trying to see that there is a reasonable and viable regulatory plan for both. That is all that we are doing at the present stage, and I want this understood, there is no judgment made now.

But I think the question that you are going to have to get if you are coming up with a notion, say, on a 3-year basis, for all new powerplants to put in essentially a closed system, that for plants that aren't built in the 3 years away you may have no problem. Or for all plants, in going back to those old plants, you are going to go back to the old plants, permit them to operate and put in their treatment facilities as I understand your proposal, within a reasonable time, the same way as we go to any city, any industry and ask them to do it within a reasonable time.

The real hard, unique situation you have in the power situation is when a plant is under operation -- let's suppose for sake of argument we have given everyone 3 years. One plant is due to open in 1 year; one plant is due to open in 2 years. Do we allow those plants to open provided they have agreed to put in what may be the regulatory agencies considered are needed facilities, or do we hold them back and don't let them throw that switch to open until they have the facilities? What do we do? (Applause)

MR. CURRIE: I have another question, Mr. Chairman. What is the likelihood that provision A. 1. of the Federal recommendation will require backfitting of existing facilities?

MR. STEIN: Well, I think an engineer or possibly a biologist would have to answer that.

Can you answer that?

I will give you a supplement to that, if I may, Mr. Currie. Do you know of any existing facilities that don't meet A. 1. now?

MR. CURRIE: That, I think, is my question.

MR. STEIN: Yes. I don't like to fumble around this close to lunch.

MR. MAYO: By way of observation, Mr. Currie, for the limited analysis -- the analysis that we have made, it appears to us that most or perhaps all of the existing plants would be able to meet the requirements of A. 1. by going to improved discharge structures, as distinguished from the possibility for having to go to a closed cycle cooling system.

MR. CURRIE: And how big a job is it to rebuild the intake and discharge structures on existing plants?

MR. MAYO: Well, I think it is going to depend on what is already there in the way of facilities, and what physical local considerations need to be taken into account in order to meet the requirements of 1. A.

Each one of these dischargers, at the present time, is a separate individual discharge and to try to collectively generalize on what it would require, I don't think we can do it meaningfully at this time.

MR. STEIN: Wait a minute. Are we getting into the same kind of discussion we had before? Should any of these take more than 3 years, for example?

MR. MAYO: Oh, no.

MR. STEIN: Then, we can generalize.

MR. MAYO: I got the impression Mr. Currie was asking what would be required, not what period of time would be required.

MR. CURRIE: My present question has to do with the impact of section A. and particularly Section A. 1. on existing facilities in terms of cost and feasibility of compliance.

MR. STEIN: How many of the plants in existence would be required to put in extensive modifications to meet 1, do you know?

MR. BRYSON: I don't have the numbers at my fingertips.

MR. STEIN: May I suggest, then, I think this is very important. Would it be possible to have that --

MR. BRYSON: Yes.

MR. STEIN: — after lunch?

MR. BRYSON: Yes.

MR. STEIN: All right.

Are there any other questions or comments?

Mr. Purdy.

MR. PURDY: Mr. Stein, the wording under A. 1. is somewhat interesting. This maximum distance of 1,000 feet from a fixed point adjacent to the discharge — it doesn't say "1,000 feet from the discharge point," it says "a point adjacent" to it. And I am wondering how this is to be interpreted and what really is meant by this "point adjacent to the discharge?"

MR. BRYSON: Our thinking on that, Mr. Purdy, was: A lot of information was presented at the workshops concerning the flexibility that can be achieved with a discharge structure, that it can be made pretty adaptable to any configuration of a discharge plume that you wanted.

Now, we were trying to provide some flexibility to the dischargers by making this 1,000 feet from the point adjacent to the effluent pipe.

Let me give you an example of that. That might clear it up easier. If you have a discharge plume coming out of the pipe, that is 2,000 feet long, the area — and a very few feet wide, say — the area — the restrictive nature of that — that is no more restrictive than if you set a point 1,000 feet out from that discharge and make that your point of monitoring. So you are measuring 1,000 feet from that point back to the discharge and 1,000 feet further out. So that the area covered by the plume is no greater than a straight 1,000 feet from the discharge.

I obviously left you totally in the dark now. (Laughter) Well, let's try it again.

The whole purpose is to provide some degree of flexibility to the discharger.

MR. PURDY: I am with you up to there.

MR. BRYSON: Okay. You are with me up to there. Very good.

MR. CURRIE: Are you saying, Mr. Bryson, that we should interpret 1,000 as meaning 2,000 or however much we choose to depending on how far out we start measuring, say a mile?

MR. BRYSON: No, the purpose is to allow flexibility in the discharge structure itself. Now, we are trying to minimize the impact of the area of the discharge plume.

Everybody there so far? All right, now, it may be equally as nonoffensive to make the point 1,000 feet from that discharge pipe as to make the point at the discharge pipe, due to the configuration of a discharge plume.

If we had some of --

MR. STEIN: Mr. Bryson, may I suggest --

MR. BRYSON: Yes.

MR. STEIN: -- that if it takes this explanation, we also better think of fixing up this language a little so we can understand it, because it doesn't seem to me just on the basis of this discussion that we really have a fruitful basis for understanding the regulation, particularly on as vital a point as this one.

MR. BRYSON: You know, Murray, you have often said in the past that an engineer can't talk without a blackboard. That is just about the case here.

MR. STEIN: Well, I don't think we have a blackboard. We have this language, and I think the engineers developed the language. We also have an engineer from Michigan down there. I can understand him when he talks about 1,000 feet from the discharge. I know what that means. Or if you want to set one point for each plant and give them 1,000 feet to fool with, from any reasonable point from their plant, that is another thing that I can understand. But I think we have to resolve that in -- I am sure you know what you mean there. I am not --

MR. BRYSON: True.

MR. STEIN: But I don't think it is put down here in a kind of language that communicates to the people here. Maybe you want a little more time to think possibly of how this language can be clarified. We are going to have to adjust this language.

MR. PURDY: Mr. Stein.

MR. STEIN: Mr. Purdy.

MR. PURDY: Mr. Bryson, I am wondering if you are saying that if you have a high velocity discharge that this point adjacent to the discharge might be where the -- say the initial velocity of this discharge is lost and now approaches natural lake currents, and then the 1,000 feet is measured from this point of where the velocity is lost? Does that, say, approach the thinking?

MR. BRYSON: It does in one possibility. Again, there is such a wide flexibility in these discharge structures that, yes, that is one example. But there are other situations that are comparable to that.

MR. PURDY: I think this makes it difficult to write into a standard.

MR. STEIN: So do I.

Why would you say, at a maximum distance of 1,000 feet from a fixed discharge point from each plant, from a single fixed discharge point?

In other words, you pick one place in a lake -- if this is what you mean -- and there you kind of pick a place certain and then you have 1,000 feet to fool around with within that space. How about that?

MR. BRYSON: Yes, around that point.

MR. STEIN: I think this is largely a drafting problem. Perhaps you can find a lawyer or two during lunch and we will try to work it out. (Laughter)

MR. BRYSON: Do you want to keep these regulations short or make them long?

MR. STEIN: They can't be any longer and more opaque than what I have been reading here.

Are there any other comments or questions?

MR. FRANGOS: Yes, Mr. Chairman.

MR. STEIN: By the way, I don't want to lose that point, but you have a 96-hour TL_m without an explanation of what TL_m is in your proposal, and I would like to know how many people in the room know what TL_m is?

Mr. Frangos.

MR. FRANGOS: Yes, I was wondering if Mr. Bryson has determined how or what the mechanics are for reaching an evaluation by June 30, 1971, on whether we meet those temperature requirements. Are we talking about modeling, or have you been out on the lake doing some work?

MR. BRYSON: I think it could be a combination, Mr. Frangos, of both. With the expertise that is available at the State and Federal level, with what should be expected from the various types of existing discharges, and with appropriate sampling in the field, I think this can be determined rather quickly.

MR. FRANGOS: For a large measure, I assume it would be empirical because how do we -- I mean do you have information, for example, on what is happening in December? How will we know that in June? I am just trying to get a feel for this.

MR. BRYSON: In order to implement it for the months that obviously we don't have between now and then it would be somewhat empirical based upon the best technical judgment of the experts in the country.

MR. FRANGOS: And these experts would be available by the EPA between now and the first of June to make that evaluation. Again, we have got a real problem in terms of resources of putting this information together, getting out of the lake what we have to get out of the lake, and to make an evaluation.

MR. STEIN: I think that is one question we can get an answer to. Is that feasible, Dr. Mount?

DR. MOUNT: I am sorry. What is the question?

MR. STEIN: The question is whether we can supply the experts to the States to give them an evaluation of the figures that we have in 1. A. by June 30, recognizing that they will not have experienced July, August, September, October, November, and December, by June 30, and will not be able to set out a junior clerk with a thermometer in his grubby hands. Will we be able to assist them to come up with this judgment by June?

DR. MOUNT: I think Mr. Mayo should answer that.

MR. MAYO: In terms of the resources and in keeping iwth a number of dischargers that are involved, and I would hope the availability of some photogrametric techniques, I think that there is the opportunity to meet that date or one very close to it. In the matter of dollar resources, Mr. Chairman, we are speaking in terms of June 30, 1971, in anticipating the availability of resources.

MR. STEIN: I don't know, Mr. Mayo whether I speak for the conferees, but let me pose this question. If we are going to ask the conferees to accept this schedule as Mr. Frangos has pointed out, it is going to be very difficult for the State to come up with this result by June 30, 1971, by its own resources, and it is going to take 6 months' projection of information which we might not have, and they don't have that expertise nor can they afford it, I think before we can ask them to accept that date, we have to give them a yes or no answer whether we are going to help supply one. Right?

MR. MAYO: Certainly, there is a commitment to help, Mr. Chairman.

MR. STEIN: Or supply it.

MR. MAYO: To do the whole job?

MR. STEIN: No, to help them so they can come up with this answer by June 30, 1971.

If we have the commitment to help them and make the resources available, I think that is Mr. Frangos' question.

MR. MAYO: Well, I would have to say, Mr. Chairman, this would be the most optimistic date that we could make. If at this point in time there is a reservation on the part of the States in terms of their ability to commit resources and to participate -- and we do want this to be a cooperative effort -- then I think we are required to address ourselves jointly to the reasonableness of this date in terms of the States' ability to participate, and I think in terms also of their consideration of the reasonableness of making those kinds of projections in this period of time.

At this point, I think that the date is open to discussion and subject to a response from the States in terms of their ability to respond with resources and commitment to participate and to reasonableness of the date in terms of making these estimates.

MR. STEIN: I think we have outlined the question.

May I suggest that this can be more easily resolved by deferring now, asking you and the States to get together with informal caucuses on this question. I know you will get together on this and others before we conclude and see what kind of date we can come up with.

Are there any other questions?

MR. CURRIE: Yes, Mr. Chairman, paragraph A. 4. of the Federal proposal speaks of backfitting inert mechanical devices for fouling problems.

I wonder if we have any information about the practicability as to cost of doing that.

MR. BRYSON: I think for that question, let's call on Dr. Tichenor from our Corvallis Laboratory to respond.

Dr. Bruce Tichenor.

DR. TICHENOR: My name is Bruce Tichenor. I work for the Environmental Protection Agency with the National Thermal Pollution Research Program in Corvallis, Oregon.

The question had to do with the practicability and cost of backfitting condensers with mechanical devices.

I have to admit I am not an expert in this particular area. I do know that the Tennessee Valley Authority has had some experience in backfitting these devices, so in terms of its feasibility, it is feasible. I really can't give you any good information on the cost; I just don't have this available to me right now.

MR. STEIN: Let's go over your question again. I know we have been on this particularly with the Tennessee Valley and other southern companies. You say it is technically feasible.

DR. TICHENOR: Yes.

MR. STEIN: But do you have any idea the time it takes, Bruce?

DR. TICHENOR: I really don't. I think this is a similar question to backfitting cooling devices. I mean we can make general statements about its technical feasibility, and I think everybody will agree that it is technically feasible, but I think when you get to any one specific case you would have to look at that case and look at the design limitations which are there right now and then make a decision.

MR. CURRIE: Finally, I would like to ask whether the ensuing Federal witnesses will address themselves to the question why the Federal Government has decided to depart from the recommendations of the Technical Committee. We have before us a detailed Federal proposal. I think we are entitled to some reasons.

MR. STEIN: By the way, I am not sure you are going to have any ensuing Federal witnesses other than technical witnesses. I think we can -- [illegible] you want to handle that, Mr. Mayo?

MR. MAYO: Yes. I think what I would like to do would be to proceed with the presentation by Dr. Mount and then following that, for whatever it can contribute to answering your question, through this further witness.

MR. STEIN: Are there any other questions?

If not, I have two telegrams here. One from Governor Ogilvie designating David P. Currie, Chairman of the Illinois Pollution Control Board as the official conferee for Illinois at this Conference. It says primarily, actions at this Conference will relate to adoption of standards. This telegram without objection will be put in the record.

(The telegram from Governor Ogilvie follows in its entirety.)

"Pursuant to Illinois Environmental Protection

Act section 5 (c) the Illinois Pollution Control Board has 'the authority to act for the State in regard to the adoption of standards for submission to the United States.' Therefore, I am designating Mr. David P. Currie, Chairman, Illinois Pollution Control Board as the official conferee for Illinois for this Conference since the primary actions taken at this Conference will relate to adoption of standards. The Environmental Protection Agency of Illinois is charged under our statute with implementing and enforcing such standards and will continue to provide personnel for the technical committees of the Conference."

MR. STEIN: And also a telegram from Mrs. Helen Hoock, and this telegram asks that we meet our responsibility; no thermal discharge; standard must be adopted and enforced immediately.

Without objection this telegram will be put into the record as if read.

(The telegram from Mrs. Hoock follows in its entirety.)

"CARP, Community Action to Reverse Pollution, demands Conference meet responsibility. No thermal discharge. Standard must be adopted and enforced immediately."

MR. STEIN: Let us recess for lunch until 2:00 o'clock.)

(Noon recess.)

AFTERNOON SESSION

- - -

MR. STEIN: Let's reconvene. The Conference is reconvened.

Mr. Mayo -- I guess Mr. Mayo isn't here on time this afternoon, Is Mr. Bryson here to answer Mr. Currie's questions? If not, let's call on Dr. Mount.

Dr. Mount, will you come up?

STATEMENT OF DONALD I. MOUNT, Ph.D., DIRECTOR, NATIONAL WATER QUALITY LABORATORY, ENVIRONMENTAL PROTECTION AGENCY, DULUTH, MINNESOTA

DR. MOUNT: There are copies of my presentation available for the conferees. Does anyone here have them?

My name is Donald Mount, and I am Director of the National Water Quality Laboratory, Environmental Protection Agency, at Duluth, Minnesota.

Mr. Chairman, I would like to make a few preliminary comments about my role in this, in that it is my responsibility, as I understand it, to attempt to make an objective appraisal of the data available and not necessarily to support or refute any particular decision that might be made by the conferees, but rather to try to attempt to relate to them -- to you what I believe is the best evidence available as to the effects of thermal discharges or particular temperatures in Lake Michigan.

In doing so, we look at two questions: 1) what are the requirements for the organisms that are there, and the organisms that are to be protected, and, 2) of course, we have to look at how this relates to the existing conditions.

I would like also to mention that in my prepared comments that I hope will be passed out to you shortly, I have deleted references to the supporting data that goes into this simply for the sake of making it more readable and shorter.

We do have these references from the literature. We have been combing the literature as well as our own research now for 2 years and what I bring to you is clearly not something which I conjured up but rather a summary of many, many people's work including some who have appeared before this Conference before.

I want to emphasize that the lack of references in this does not mean that we are claiming credit for all of the information.

D. I. Mount

In the summary — does anyone here yet have copies of this?

MR. STEIN: Yes, I have a copy.

DR. MOUNT: Has it been distributed?

MR. STEIN: I must have Mr. Mayo's copy. Maybe it is a good thing he didn't show.

DR. MOUNT: Well, I will proceed, Mr. Chairman, then, without these copies, because they are apparently not available right now.

MR. FETTEROLF: Who has them?

DR. MOUNT: Mr. Pratt, I think, has them.

In the summer of 1969, the National Water Quality Laboratory provided recommendations for temperature standards on Lake Michigan. We have now been asked to discuss our recommendations. Our views have changed only slightly since 1969 and these changes are due to more evidence gleaned from the literature, as well as new research that we have completed, but by and large, our present recommendations are not significantly changed. My discussion today is based on an assumption that I believe is now well accepted by informed people, that the lake as a whole will not be warmed, except in localized areas, by powerplants. As has been said many times before, the effects of temperature on Lake Michigan will show first in the aquatic biota rather than on other water uses such as for swimming and for drinking water supplies. Therefore my discussion will center around aquatic life criteria.

In spite of all the words that have been said regarding temperatures in Lake Michigan and the effects of powerplant discharges, there are a number of principles and concepts that need to be clarified. By way of introduction, I would emphasize that unlike pollutants such as DDT or lead we are not striving for a zero concentration, but rather for the range of temperatures which is best for the well-being of the aquatic biota of the lake, and we further recognize that the temperature range is clearly different in various seasons.

MR. PURDY: Mr. Chairman, I would like to have a copy of this statement so I could follow and know what is going on.

MR. STEIN: Mr. Mayo, is it possible for us to get copies of the statement for the conferees?

MR. MAYO: There should be statements here, Mr. Chairman.

MR. STEIN: We said we were going to reconvene at 2:00 o'clock, Mr. Mayo.

MR. PURDY: I don't understand how the press can have the statements and we don't have it here.

MR. STEIN: Can you explain that? I guess they can. Dr. Mount, to whom did you give copies of the statement?

DR. MOUNT: The original copies, Mr. Chairman, were sent to Mr. Bryson in Minneapolis on Saturday morning.

MR. STEIN: Thank you.

(Whereupon, Dale Bryson entered the room and distributed copies of Dr. Mount's statement to the conferees.)

DR. MOUNT: I will pick up again now in the middle of page 1.

In spite of all the words that have been said regarding temperatures in Lake Michigan and the effects of powerplant discharges, there are a number of principles and concepts that need to be clarified. By way of introduction, I would emphasize that unlike pollutants such as DDT or lead we are not striving for a zero concentration, but rather for the range of temperatures which is best for the well-being of the aquatic biota of the lake, and we further recognize that the temperature range is clearly different in various seasons. While toxicity levels may vary some, on the whole there is little difference in safe concentrations of DDT or lead as the seasons change. This is not so with the temperature requirements and so a single value is not enough to specify necessary temperature conditions. The problems of establishing acceptable temperature limits are further complicated because within some limits the aquatic biota has the capability of shifting critical seasons such as spawning, to coincide with a faster or slower warming rate of the water, either from natural or artificial causes. On the other hand, since many of the important species require rather specific foods, particularly when they first hatch from the eggs, there is a danger of upsetting the timing of food supply of the right type with the various life stages of the desirable fishes in the lake.

One of the significant points, often not recognized, is the different temperature requirements for various species of fish in the lake. Lake Michigan must be considered as a 2-story lake in the summertime; that is, warmwater fish in the surface waters and coldwater fish near the bottom. There should not be significant changes in the relative volumes of the epilimnion and hypolimnion. The cold, deep waters must be preserved for salmonids, in particular, if they are to survive during the summer months. While we mention here only maximum temperatures, it is important to remember that maximum temperatures are intended to be maximum temperatures and not sustained for long periods of time. It would be far better to use both mean and maximum temperatures in our standards; in this way more flexibility could be permitted and still assure adequate conditions for the biota. Regulatory agencies, however, resist the use of mean temperatures in standards and, to accommodate them, we have recommended only maximums that are protective. Repeating again, it is ultra-important that maximum temperature standards not be used as safe values for prolonged periods of time.

There are relationships that emerge as we examine in detail the available literature and research on temperature effects. Several measures of effect fit together to provide supplemental information regarding acceptable temperatures for various species. We have found that temperatures that fish select in their natural environment are the same temperatures at which food is most efficiently converted to fish flesh and at which the growth rate is best. Usually each is a good estimator of the temperature requirements for a particular fish. Sometimes information on each of these is not available, but having established this relationship, any one of the three can be used to estimate requirements for other species. Particularly in the summer months lethal temperatures are not much higher than the temperatures at which best growth occurs. Therefore, the control of temperature to within a few degrees is truly necessary if we are to avoid adverse conditions and yet take maximum advantage of the heat that is there. We strongly support the many observations showing that fish do congregate in warmwater discharges, particularly in the cooler months. Caution during the cooler months is necessary, however, because change in wind, currents, or plant operations that shift or dissipate the plume can and have resulted in fish kills due to the drop to ambient temperature. This effect in part determines the maximum temperatures permissible in the winter months and is the basis for establishing the maximum values for those months. It is equally true that in the summer months when temperatures become too warm, fishes will move away from these plumes and will not be killed as long as there is a suitable place to go. Lethal temperatures have meaning only when related to the length of time at which that temperature occurs. There is relatively little difference between lethal temperatures for a 24-hour period and those for a longer period. Therefore, we usually use temperatures that are lethal in approximately 24 hours as representative of lethal temperatures for the species. Obviously, for short period of time, temperatures may go higher without demonstrable damage. It is not survival though that we are protecting, but rather growth and reproduction, events which almost always require significantly lower temperatures than lethal ones.

The following, then, are key points of concern regarding temperature standards on Lake Michigan:

1. Safe temperatures vary with season and species.

2. Heat is not persistent.

3. Timing of food and fish hatching is precarious.

4. In the summer, Lake Michigan is "a lake over a lake," the top one is much warmer than the bottom one.

5. Maximum temperatures are not safe for long periods-- the lethal temperatures must be related to time.

6. Mean temperatures must be lower than the maximums for growth and reproduction.

7. Fish kill hazards are greatest in winter.

If we could now turn to the transparencies, in Figure 1 we are showing the maximum temperatures of record for each month at various locations around Lake Michigan. This is Figure 1 in your handout, by the way. (See p. 109.)

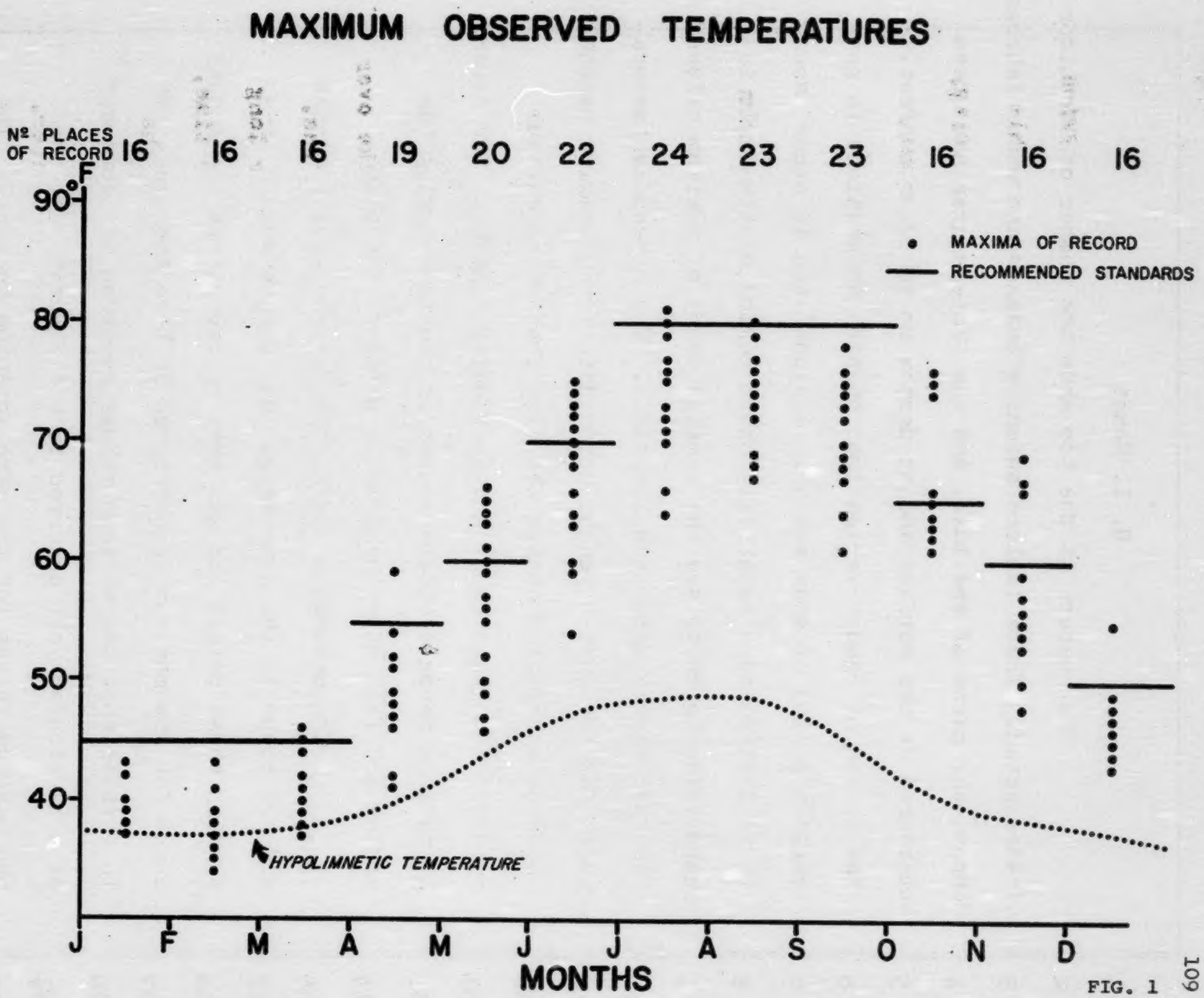
MAXIMUM OBSERVED TEMPERATURES
Nº PLACES OF RECORD
16
16
16
19
20
22
24
23
23
16
16
16
°F
90
80
70
60
50
40
MAXIMA OF RECORD
RECOMMENDED STANDARDS
HYPOLIMNETIC TEMPERATURE
J
F
M
A
M
J
J
A
S
O
N
D
MONTHS

FIG. 1

The numbers at the top show the number of locations represented. These include swimming beaches and water intakes from many parts of the lake, and the temperatures have been measured at the surface and at depths up to 50 or 60 feet. The period of record varies from station to station; in some cases a period of many years in included and in other cases it is limited to a relatively short period of time. It is surprizing to me to see the limited range of maximum values for such widely separated locations. The spread in temperatures for the summer months using data from swimming beaches does not materially change the distribution of maximum recorded temperatures from deeper water intakes. The spread in maximum recorded temperatures is greatest during the spring and fall when the lake is warming or cooling.

The maximum temperatures for successive months did not occur in the same year. One cannot draw a line through these points and say that it represents the annual curve for the maximum temperatures in Lake Michigan. It is certain that the maximum values recorded in September of a particular year occurred in a different year than the maximum values for the same location in April. The annual pattern as shown by this graph never occurred in any one year. Even though the picture portrayed by this graph is somewhat artificial, it nevertheless gives a reasonable picture of the variation in temperatures in surface water with respect to location and season.

Figure 2 (See p. 112) is the same base graph as used in Figure 1 with an overlay showing the lethal temperatures for various species of fish that are important in the lake.

These are shown by the open circles. I failed to mention, by the way, that the lines -- the horizontal lines in Figure 1 are drawn at the temperatures for the recommended temperatures as listed in the proposal read this morning. And, secondly, that the red dotted line is an approximation of the temperature of the hypolimnion at various times of the year. This is only an approximation and was not done by exact plotting as was the case for the maximum temperatures at the surface. So we should be thinking of two temperatures in the lake all of the time as somewhat representing the conditions. The dots representing lethal temperatures were not derived from existing temperatures in Lake Michigan -- and here I am referring to the open circles -- but from many sources both in the literature and from recent research, and are based on the requirements of the biota.

There is no real justification, in our opinion, for the often-made statement that field and laboratory

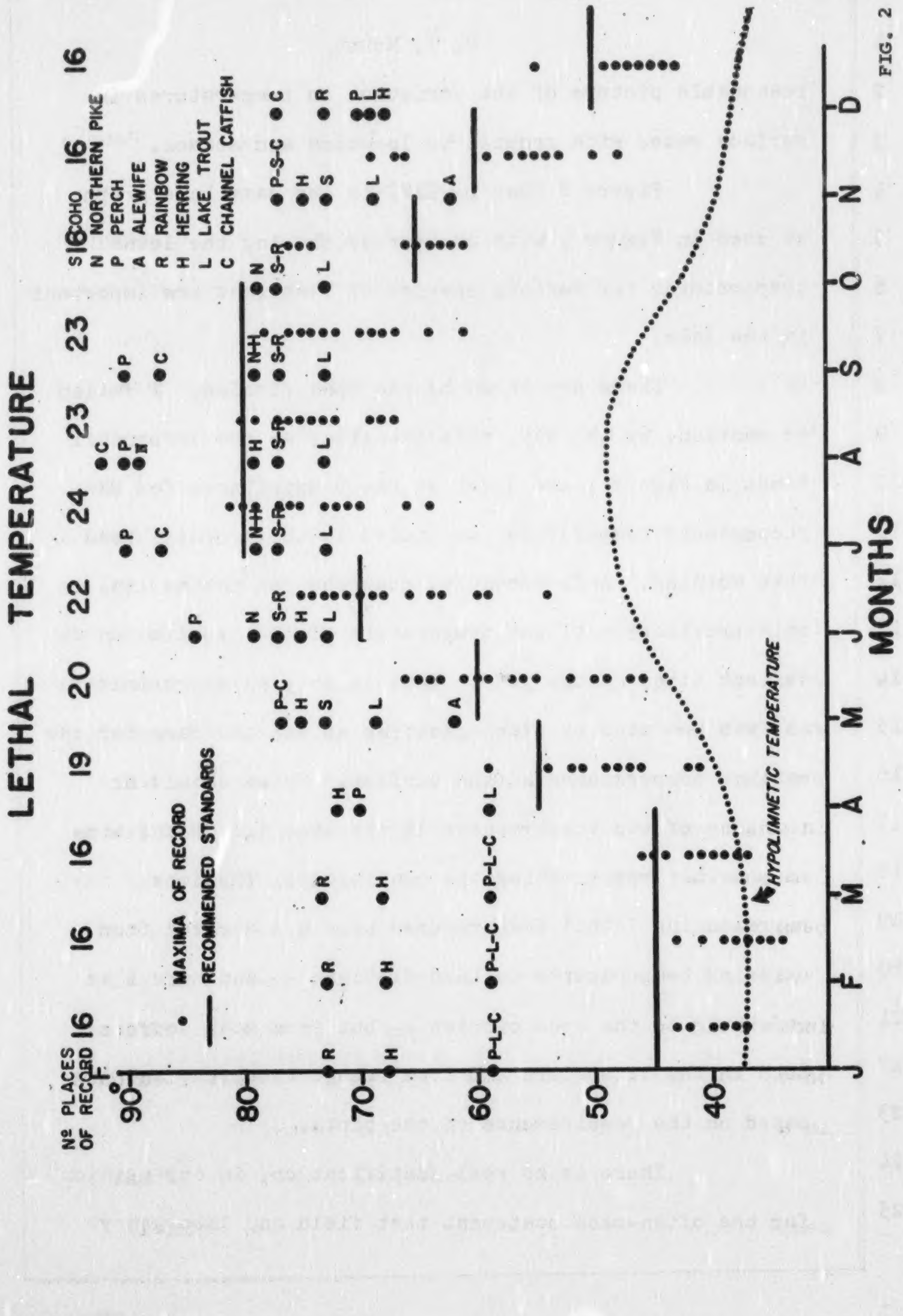
LETHAL TEMPERATURE
Nº PLACES OF RECORD
16
16
16
19
20
22
24
23
23
16
16
16
MAXIMA OF RECORD
RECOMMENDED STANDARDS
S COHO
N NORTHERN PIKE
P PERCH
A ALEWIFE
R RAINBOW
H HERRING
L LAKE TROUT
C CHANNEL CATFISH
°F
90
80
70
60
50
40
J
F
M
A
M
J
J
A
S
O
N
D
MONTHS
HYPOLIMNETIC TEMPERATURE

FIG. 2

data do not agree, or that the work of different experimenters shows completely different results. People who say this are unable to interpret and understand the conditions upon which experiments were performed. When one corrects for acclimation temperatures and other variables that might not be evident, he sees that there is good agreement between both field data and laboratory data, and among various experimenters. Dr. James Gammon, Associate Professor of Zoology at DePauw University, in a report covering study from 1967 to 1969 on work financed by a power company of Indiana and consisting solely of field surveys, collections and observations, states in his Summary, point number 5, "Generally good correspondence was found between laboratory determinations of temperature preferenda of some resident species and their abundance in different thermal zones of the river although a few laboratory studies of the species found in this river have been made." I want to emphasize this study just quoted from was a field study financed by the power industry. Individuals reviewing the information on thermal effects on aquatic life on both sides of the issue have used data in a biased manner to meet their own needs.

You will notice in Figure 2 that the lethal temperatures for a given species such as the channel catfish are different in successive months. As pointed out by the arrow, you see the lethal temperatures are increasing as we approach summer and decreasing as we approach winter. Fish during the winter months are acclimated to a lower temperature and their upper lethal temperature is therefore considerably lower than it would be for the same species in the summertime when the fish are living at much warmer ambient temperatures. Lethal temperatures for the spring and fall months when the lake temperature is changing, are difficult to position on the graph because their temperature of acclimation is changing with that of the lake. The lethal values for winter months are based on an acceptable drop to ambient temperatures. I think it is a very significant point, that these lethal temperatures in the winter are based on the drop rather than the highest value they can tolerate. We see that pike and channel catfish have lower lethal temperatures in the wintertime than rainbow trout or herring. This may seem inconsistent at first glance, but it gives a true reflection of the ability of these species to accept a temperature drop from a warmer temperature to a colder one. It makes sense when we remember that they are cold-water fish and a drop in temperature means a change toward a more desirable temperature for them. On the other hand, in the summer months, salmonids must have much cooler water and their lethal temperatures are therefore much lower during the summer months than are those of warmwater fish.

Figure 3 (See p. 116) is Figure 1 -- the same base map again -- with an overlay showing the growth requirements of important fishes of the lake. Growth requirements are more properly relatable to mean temperatures than to maximum temperatures and so we have plotted for maximum growth requirements those temperatures which are approaching the maximum values at which acceptable growth occurs. Considerably cooler mean temperatures are required for best growth. If maximum temperatures exceed these values for short periods of time on any one day, it does not mean that there would be a fish kill, but simply that the temperatures would be too high for good growth, reducing it for that period -- not a catastrophic effect, but certainly biologically significant.

Since these temperatures are for growth, they are plotted for only the growing season. Here we must make the distinction of the 2-story lake, the warmer water fish are in the upper layers and the colder water salmonids are in the lower, cooler water. All the fish will find their preferred temperature and remain there for much of

MAXIMUM FOR GROWTH REQUIREMENTS

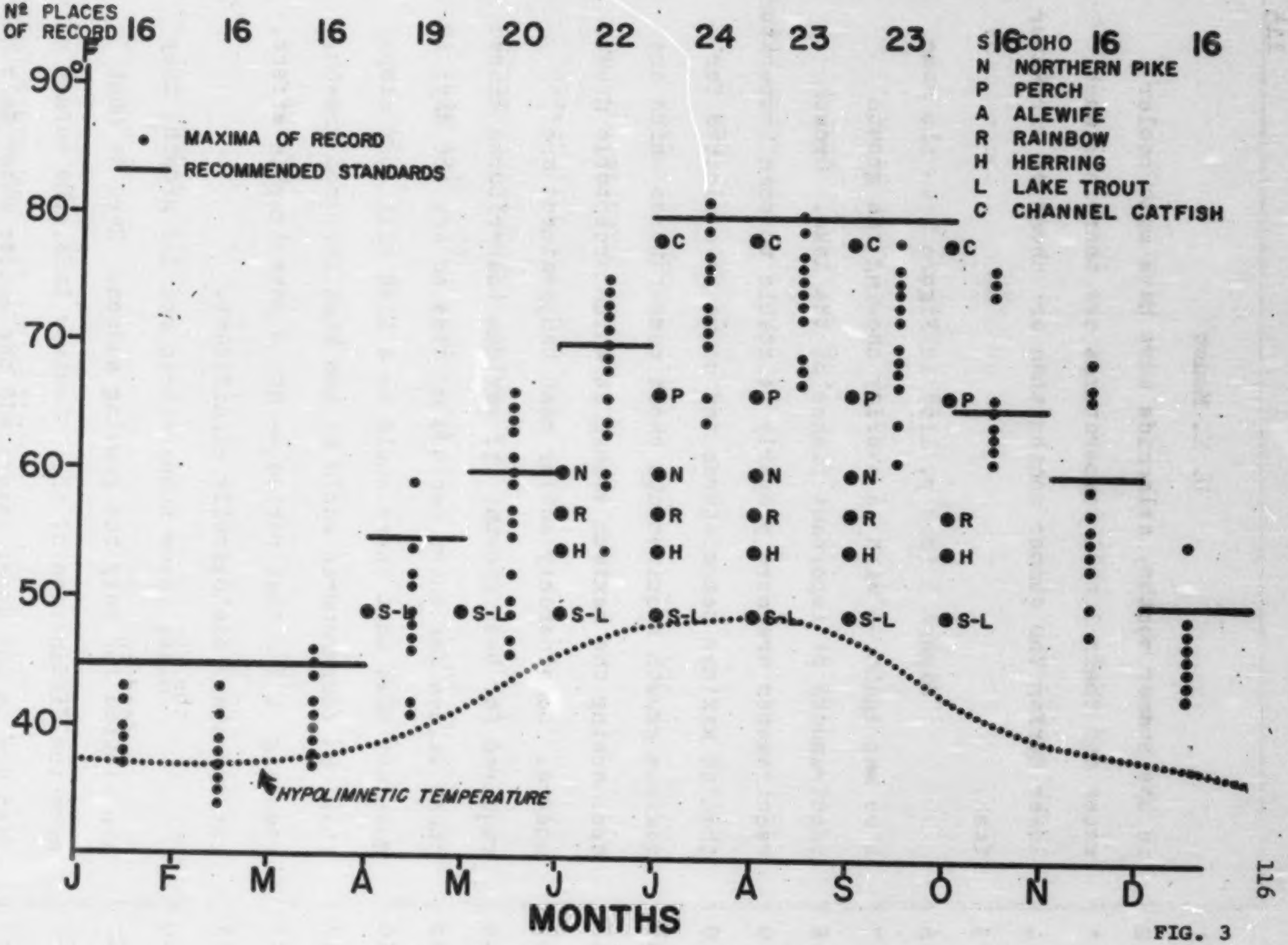

FIG. 3

the time. I think, again, that is a rather significant point to emphasize, that these species shown, for example, around 60° as having optimum growth requirement -- let me check here -- these would be such fish as the rainbow and herring, the lake trout, and so on.

You will see we have growth requirements that are considerably lower than on the surface -- than the maximum temperatures either occurring or those which are recommended. This is what I mean when I say these fish will seek the temperature they can do best at, and they will find it somewhere between the hypolimnion and the surface water, and this is where they will remain. So that I am fully aware that these growth requirements are below these maximum temperatures, but notice that they are above the hypolimnionic temperatures, and so they select the place where they can do well.

The standards should be specified for surface waters and hypolimnionic waters to define the requirements for all the species. Some species such as rainbow and coho salmon feed in surface waters, at times so that surface waters should be as low in temperature as is feasible for feeding. This makes such species, as the coho and the rainbow, more accessible to the sport fisherman. We do recognize that fish will move into deeper waters when necessary to avoid unacceptably warm surface water.

Figure 4 (See p. 119) is an overlay again on Figure 1, portraying spawning and maturation requirements for various species. There is less information in regard to requirements for the reproductive period than for other life stages. It is difficult to locate the temperatures for spawning for the proper months because some species will shift their spawning period depending on the temperature. There are other species that apparently do not shift their spawning seasons; spawning is controlled by photoperiod, for example. For these, matching photoperiod with temperature is very important. I have shown spawning periods for the months in which others and we have determined spawning normally occurs in Lake Michigan. We feel no change in annual cycle should be permitted until more is known about such changes.

We have precise information on chill requirements -- that is, the need for a cold period in the wintertime to initiate egg production -- for only one species of fish, the yellow perch. Perch have been intensively studied in the last couple of years at the National Water Quality Laboratory, and the work has shown rather conclusively that perch must be at or below 45° F. for a period of more than three months if they are to reproduce

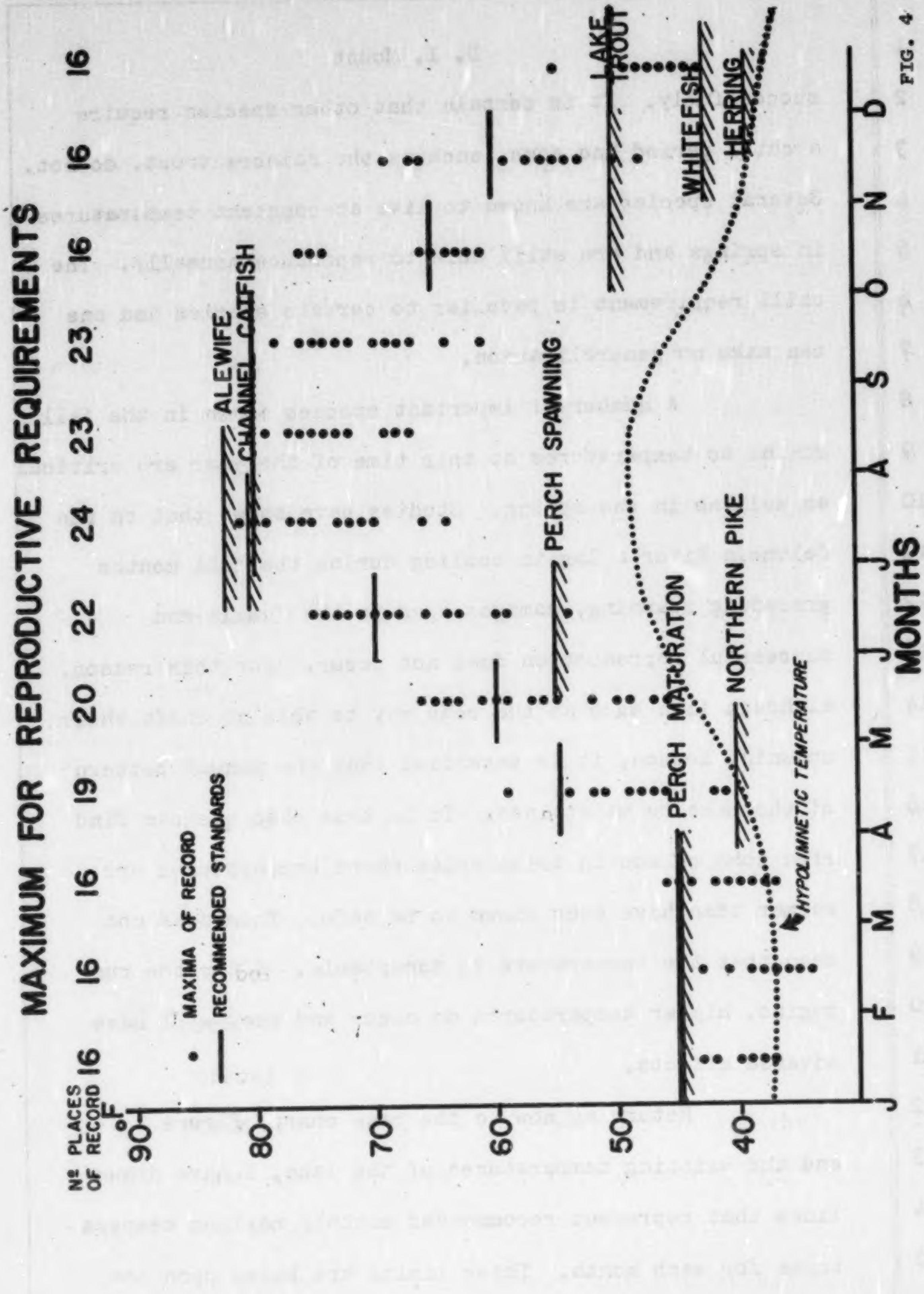
MAXIMUM FOR REPRODUCTIVE REQUIREMENTS

FIG. 4

successfully. It is certain that other species require a chill period and some, such as the rainbow trout, do not. Several species are known to live at constant temperatures in springs and are still able to reproduce normally. The chill requirement is peculiar to certain species and one can make no generalization.

A number of important species spawn in the fall months so temperatures at this time of the year are critical as well as in the spring. Studies have shown that on the Columbia River a lag in cooling during the fall months preceding spawning, damages eggs in the female and successful reproduction does not occur. For this reason, although fish such as the coho may be able to shift their spawning season, it is essential that the annual pattern of the lake be maintained. It is true that one can find ripe coho salmon in tributaries where temperatures are warmer than have been shown to be safe. This does not mean that the temperature is acceptable. After the run begins, higher temperatures do occur and they will have adverse effects.

Returning now to the base chart, Figure 1 and the existing temperatures of the lake, I have drawn lines that represent recommended monthly maximum temperatures for each month. These limits are based upon the requirements of the fish and not upon the existing temperatures of the lake. Now, compare the maximum temperatures of record with the recommended maximum values and you will see that the critical period is in April and May -- a time when the salmonid fry are in shallow water and are likely to experience these maximum temperatures.

Reports given before this conference and in the literature suggest that areas of the lake are now warmer than is acceptable for some of the species with low temperature requirements. This would be in local situations, of course. Our data show also that temperatures are a bit high during certain months and that there should not be additional temperature increases at those times. We should not find it disturbing nor think it unusual that existing conditions, even though natural, are unacceptable at times and indeed these data show that to be the case.

The acceptable temperatures in the winter, summer and fall months appears to pose little problem. One cannot reason, however, that because there is an apparent concern in only two or three months of the year that nothing need be done. Indeed, these months are among the most important of the entire year and any special precautions or treatment devices needed to protect the biota for these months are just as necessary as though such devices were needed for every month.

Leaving now the maximum values that have been recommended, any discussion of powerplant discharges would be incomplete without some comment in regard to other effects. Certainly the location of the intake structure may be as important in reducing the effects on the biota as is meeting the permissible temperatures. Many of the fish larvae and fry are very poor swimmers at a time when they are found in the inshore waters and it is for this reason that current velocities and location of intakes away from nursery grounds is very important if substantial numbers of fish fry are to be kept from entering the plant. Equally important, several species in Lake Michigan fish are likely to congregate in a current and feed on organisms being carried by it. While most swim upcurrent, they do move back and forth and can easily be swept into the plant. For this reason we recommend low velocities in the intakes. The intake should not be on the bottom in our judgement, where a number of important species dwell, nor should it be at the surface, particularly because surface water is likely to contain high concentrations of desirable plankters and numerous fish fry. Even bottom-dwelling fish must spend a time at the surface while they fill the air bladder. Because many fish species are attracted to warm water, particularly during the cool months, warm water from the discharge should not be permitted near the intake.

Keeping the discharge from nursery areas and off the bottom are obvious requirements and need little comment. Important bottom-dwelling food organisms such as Mysis are killed by temperatures of 61° F.

Chlorine and chloramines, formed when chlorine is added to lake water, are highly toxic to many organisms. We have shown, for example, that less than a part per billion of chloramines is lethal to Daphnia in 96 hours. Generally, the lethal concentrations of chloramines to many desirable forms of aquatic life are below .5 ppm. Such toxicity leads to the recommendation that the 96-hour TLm be met at the point of discharge and mechanical antifoulants be used when possible.

Finally, in regard to assessing damage from individual discharges in Lake Michigan, it is extremely difficult to measure effects of one discharge in a lake as large as Lake Michigan. This perhaps is analagous to trying to measure the effect of 1,000 automobiles on the air pollution conditions in Chicago. It is nearly impossible to do, and yet all of the cars together do contaminate the air over this city. In the same way, while the effects from one powerplant discharge may not be discernible, this is not to say that there will not be a combined effect from many powerplants. While before and after operational studies certainly are highly desirable to identify gross changes, it is not possible with the present state of the art, to assess the impact of damage in localized areas on a big lake.

For this reason I certainly would not be completely satisfied if postoperational studies showed that there was little damage at a given point in a lake powerplant. One could not construe from that that there will be no damage to the lake as a whole. Unless we adopt the position that harming any number of organimss is significant damage, we will ultimately face the question of determining whether or not the number of organisms that are damaged is significant.

There is not a biologist at the present time who could tell you whether a thousand or five hundred thousand yellow perch fry is a significant number and would affect the lake, or even the local area. Counts on zooplankton, while they may show that the organisms are not able to tolerate passage through the plant, cannot be extrapolated directly to lake damage. For this reason it will be a long time before studies on individual powerplant discharges can be used to significant advantage in assessing impact on Lake Michigan. In the meantime, we must rely on the literature and the research work currently under way and completed to give us the best answers until the technology of population estimation in large lakes is developed. Certainly in the coming years we must develop methods by which we can measure the impact of man's activities on populations of aquatic animals with enough sensitivity to provide lead time to take corrective action before damage is irreparable.

MR. STEIN: Thank you, Dr. Mount.

Any comments or questions?

Mr. Currie.

MR. CURRIE: Dr. Mount, are you presenting us with any facts that were not known to the Technical Committee?

DR. MOUNT: I would say that for the most part I probably am not. I think the only thing that is different from the original in this presentation, if anything, is an attempt to actually plot these requirements on a graph so that they can be compared to the existing temperatures.

I hope to provide you with some idea of how close conditions are to -- how close they are to the temperatures which we believe are important and necessary for the aquatic life.

MR. CURRIE: Would it be fair to characterize your statement by saying that you are concerned over the combined effect on the lake of many powerplants, as you say, at the bottom of page 12?

DR. MOUNT: Yes, I think that is close. The main point that I am trying to make is that, in our judgment, there are many, many subtle effects of these discharges which are going unmeasured in present site studies.

For example, it was not really until relatively recently -- well, I am not saying no one knew this; I am sure somebody did — but it was not until relatively recently that I think many of us realized that the bottom-dwelling fish such as lake herring, for example, must come to the surface for a period of some days while they are filling their air bladders. These are effects which are not measured in a typical powerplant survey, and I am identifying these as being subtle effects which we had not measured to date. And, furthermore, if we killed X-number of organisms per minute, we don't really know how to use that information yet in assessing the damage to a big body of water like this.

MR. CURRIE: Thank you.

MR. STEIN: Are there any other questions or comments?

MR. MAYO: I gather, Dr. Mount, that one of the cautions you are offering the conferees is that the less water that is involved, in terms of intake into the plants and subsequent discharge, the less water that is heated as a consequence of industrial and power generation operations, the more nearly we are going to be able to maintain the environment in Lake Michigan that is compatible with the fishes that are there now.

DR. MOUNT: Yes, I think that is a fair analysis, and I would like to expand on it to this extent: to say that it is a principle of ecology which all of us who have had courses in ecology learns probably the first day we take the course, and that is that every plant or animal modifies the environment in which it lives, and for too long we have been trying to say that man isn't a part of this environment.

I think we are now beginning to realize that he really is quite a part of it, and certainly his activities are going to modify the environment the same as any other plant or animal. The fact that people live in the drainage basin changes Lake Michigan to some extent and we, I feel, from the standpoint of ecological point of view, have to give up this idea that we can live anywhere and not have an impact on the environment.

And the question, as you phrased it, or the point that you raised is that we want to have the minimum impact. I might also add the point which I wanted to make when I began, when I stated I wanted to present an objective evaluation of the data. First of all, when you do that you are unpopular because sometimes you are not strict enough and sometimes you are too strict. I guess you can't win.

But there are many places where this does become a matter of subjective evaluation. There just are no clearcut cases when we begin to deal with the amount of damage, and in these cases we are really dealing with probabilities, not all or none, and I have tried to make judgments that are middle-of-the-road. I am sure that I have failed in some cases.

MR. STEIN: Mr. Purdy.

MR. PURDY: First of all, Mr. Chairman, I would like to thank Dr. Mount and his staff workers for the very enlightening statement. It is something that we have come to expect from Dr. Mount in many other conferences that he has presented statements on. I wish we had had it many months ago.

You mention the — you say — relative impact of say an instantaneous heated load to say an organism as compared to an extended period of time. From the standpoint of the table that was presented this morning with maximum temperatures, I am wondering how these are to be interpreted, or is this to be interpreted as an instantaneous maximum, daily average, or just how is it looked at?

DR. MOUNT: Well, Mr. Purdy, it would be my judgment — I guess this is a decision which you people in part have to make, and it is my job to help you. It would be my judgment that in a lake the size of Lake Michigan that the instantaneous values for any minute or hour are not going to be drastically different than they are for a period of several hours. We are not dealing with a small stream where the temperature can change drastically. Now, this, of course, is accepting upwellings which none of us are going to stop anyway. But it would seem to me that there would be little difference.

Now, perhaps some of the people who have worked more clearly with Lake Michigan can answer that better than I can as to whether these values would be greatly different. I would tend to doubt that they are.

MR. PURDY: Well, as we have attempted to arrive at some temperature restrictions on a monthly basis for Lake Michigan, we have looked at a number of individual measurements, The fact is, I think it is about 50,000 measurements now. From the standpoint of the monthly temperatures that you have recommended, as it relates now to the natural temperatures in the lake, I would say on the open waters we are in pretty close agreement. But as we move into the inshore waters, and in particular for those waters along western Michigan where you have the prevailing westerly winds that push the warm surface lake waters up along the Michigan shoreline, makes it valuable from the standpoint of recreational swimming. I believe that we do have natural temperatures that may extend out into 20-foot water depths or more that exceed by several degrees the maximums that you have proposed, and in particular as you move into October, that these waters stay warmer than the 65° maximum that you have proposed there quite frequently.

DR. MOUNT: I certainly recognize the validity of what you are saying. There are two points that I would make in regard to this. First of all, I looked at the data that I had, which I believe Mr. Fetterolf prepared, on the swimming beach temperatures. As I indicated in my comments before, I was really amazed that there wasn't a greater difference between these and the intake temperatures from the water intakes on the Michigan shore. I believe Indiana had provided swimming beach temperatures, and possibly Wisconsin, too. I am not sure. I looked at an awful pile of data to sort these numbers out, so that I would suggest that perhaps this — first of all, that this difference in the shore water areas is not maybe as great as one would think that it would be just on the surface of it.

Now, you may have other temperature data to show differently, I don't know. But I am sure there will be cases where this is a problem.

My second point would be, as I said again in the paper, I think we are obviously going to face a number of situations where temperatures — maximum temperatures occurring as the result of apparently natural effects do exceed these recommended values. While I recognize, I think, the regulatory problems involved, I also must recognize the biological principle involved. That is that no matter what made the water warm, it may be that it will be harmful if it gets too warm, and perhaps these are situations which have to be dealt with on a judgment basis when they occur.

Certainly if the whole eastern shore of Lake Michigan is running warm, that is obviously not due to a single discharge somewhere. This has to be taken into consideration much in the same way that any other limit which we place on water may be exceeded from causes beyond control and have to be ignored at that time.

I think this is an enforcement problem which I am not capable of dealing with myself. That doesn't solve it. But, on the other hand, I also know that if we establish standards which are so high, or maybe I should say so low -- maximum temperatures -- that natural conditions never exceed these, I don't think we will have much either.

MR. PURDY: I don't disagree with you, and I appreciate your comments because at some point in time when somebody measures it and then asks the enforcement agency to take action to stop this, it is nice to be able to turn back to the record and show that it was recognized that at certain times natural conditions will exceed the recommendations.

DR. MOUNT: I had hoped to have a draft to try to explain the way we view these maximum temperatures, and I failed to have time to make it.

But if you can envision a month with daily temperatures fluctuating, as my fingers do (indicating), I think these maximums simply put a lid on this. We, as I pointed out in the paper, expect that the temperatures must and will go well below these much of the time—that we are not talking about a sustained temperature.

MR. PURDY: The other question that I have relates now to this matter of the maximum distance of 1,000 feet.

Did you participate in the development of this rationale, and, if so, could you explain it?

DR. MOUNT: I was involved in discussions regarding the distance that it should be recommended and whether or not how important my opinion was in deciding on 1,000 feet, I am not sure.

But there is this kind of thinking that first of all a mixing zone I feel by definition is a place where receiving water standards are not met. That is, the conditions are less than we are striving to achieve in the receiving water.

If our receiving water standards — and I think that these proposals are — are set at about the margin where we will experience significant damage if we exceed them substantially — then there will be some damage occurring in the mixing zone. So the question you ultimately come to is how much sin is acceptable? And the value of 1,000 feet, as I recall in our discussions, was arrived at because with the proposed expansion in the number of plants that this would still keep the area in the mixing zone at or below 1 percent of the shore area.

MR. PURDY: Now, you say the surface 3 feet — would the point of measurement be any point within the surface 3 feet or at a 3-foot depth?

DR. MOUNT: I can only respond to that from the standpoint of the biological need, and that would be that there would not be a significant difference whether you measured it 1 inch below or 36 inches below. So it would seem to me that anyplace would be reasonable from the biological point of view.

MR. PURDY: Because at some point in time, this plume may float. It may only be a foot in depth. And if you measured it 3 foot in depth, you could miss it. So anyplace within the top 3 feet.

DR. MOUNT: Yes, sir.

MR. PURDY: Now, in the wintertime there is this discussion about the plume may sink, so that on the surface 3 feet, you might meet the 1,000 foot requirement, but now how about the effect on the hatching of the eggs on the bottom, and so forth? Does this require special consideration?

DR. MOUNT: Well, it was my recommendation originally — I don't remember whether it is in there now or not — that it be specified that the plume meeting that temperature which does not exceed the maximum, or that temperature which is not more than 3° above ambient, whichever is less that that temperature — anything over that not touch the bottom.

MR. PURDY: Okay.

MR. STEIN: Are there any other further questions or comments?

MR. MAYO: Dr. Mount, in your presentation on page 12, you speak to keeping the discharge from the nursery areas and off the bottom as being obvious requirements.

In the recommendations of the Technical Committee, there is also a direction to this point in terms of designing the discharge structure to prevent the thermal plume from reaching the lake bottom.

At the moment, that kind of a specific provision is not included in the proposed regulations that were laid on the table this morning for the conferees to consider.

I would gather that it would be your recommendation that there be a provision in these proposed regulations that the design of discharge structures be such as to prevent the thermal plume from reaching the lake bottom.

DR. MOUNT: Yes, I think this would be desirable.

MR. STEIN: Are there any other comments or questions?

I would just like to ask a general question, Dr. Mount, which may serve to bring out the point in the colloquy you had with Mr. Purdy.

I assume there were times long before Columbus came to America when conditions were such that there were waters in this area of the country where the heat got so high that fish died because of the heat. Is that a fair assumption?

DR. MOUNT: I am sure that that is true.

MR. STEIN: Right.

Now, if that is the case — and I think this is going to continue, whatever we do — I really don't think that is what we are addressing ourselves to. If you have natural conditions that are going to create an unusual situation —

... Cries of "Can't hear you" ...

MR. STEIN: If we have natural conditions which are going to create an unusual situation, this is not what we are dealing with here. What we are dealing with is manmade pollution. As I tried to develop with Dr. Mount, I believe that given these Great Lakes long before Columbus came, there were certain periods of the year or areas of the lake where you might have unusual heat conditions where you were going to get fish kills.

I don't think that any program we can devise will stop this. Let us suppose we have a relatively remote area of say Wisconsin or Michigan along the lake where there is no development and these conditions would occur again, presumably we would get the same effect.

As we do in many, many of our areas, I think we are dealing here with manmade impacts. We are not going to -- and I don't think you can -- hold any industry or any municipality or any individual responsible for what happens in nature. We recognize the fact we have these variances in nature itself.

DR. MOUNT: Yes. I think you have worded it as a lawyer would word it. I would word it according to a biological principle which would be that naturally occurring temperature maximums and minimums already limit the distribution of fish, and if we establish standards which permit those extremes to be reached or exceeded, then we are going to have an adverse effect.

MR. STEIN: Are there any other comments or questions? If not, thank you very much, Dr. Mount.

Mr. Mayo, do you have — or Mr. Bryson — those reports we promised?

MR. MAYO: Yes. Just a moment, Mr. Chairman.

MR. BRYSON: Mr. Chairman, we have passed out to the conferees a tabulation of the plants that are either under construction, operating, or proposed in the — excuse me — or are in the preconstruction stages.

On this chart we have shown the name of the plant, the size, and the type, operating date, the quantity of waste heat that will be discharged, the present discharge design, and the required modification.

Now, in summary —

MR. STEIN: May I make a suggestion?

MR. BRYSON: Yes, sir.

MR. STEIN: You know we have a lot of powerplant operators out here and a lot of people out here and, as I pointed out, at some of the meetings in Washington, this is like a grant program. You come up with these generalized principles, but everyone in the room is interested in what this is going to do to his plant.

Now, would it be possible to run down this list just with the first name and indicate what the required modification of your proposal you believe would require? Would this be reasonable?

MR. BRYSON: Certainly.

MR. STEIN: Okay. Because I think that is what the people are waiting to hear. Okay.

MR. BRYSON: Okay. For plants under construction right now, we have the Zion Plant, Commonwealth Edison that will require cooling towers. (Applause)

The Cook Bridgman --

MR. STEIN: Please, let's try to do this with -- withhold your applause until the end (Laughter) and Mr. Bryson will gratefully acknowledge it.

Cooling towers for the Cook plant; Palisades, cooling towers; Point Beach -- and there we have the two units. The unit that is operating would probably have to improve the discharge structure or go to cooling towers. Unit No. 2, which is under construction, would have to go to cooling towers. Kewaunee plant would have to go to cooling towers; Michigan City, the new unit, could go to cooling towers; the old unit would be an improved discharge

IMPACT OF EPA PROPOSAL

PLANTS UNDER CONSTRUCTION ***Plants will also be required to install mechanical cleaning devices and to meet requirements WRT intake and discharge location and design.

Power Plants	Size & Type	Operating Date	Waste Heat in Cooling Water - Approximate Maximum Daily	Present Discharge Design	Required Modification
Zion-Zion, IL Commonwealth Edison	2100 MWe 2 pwr units nuclear	4/72 & 5/73	Billion BTU/hour 13.6	Offshore high-speed discharge	Cooling towers
Cook-Bridgman, MI	2200 MWe 2 pwr units nuclear	9/72 & 6/73	14	Offshore low-speed discharge	Cooling towers
Palisades-Covert Township, MI Consumers Power Co.	700 MWe 1 pwr unit nuclear	5/71	5	Cooling towers shoreline in interim	Cooling towers
Pt. Beach-Two Rivers, WI Wisc. Electric	447 MW	Operating	3.4	Shoreline discharge	Improved discharge structure or cooling towers
Unit #1	1 pwr unit nuclear				
Unit #2	447 MW 1 pwr unit nuclear	6/71	3.4	Shoreline discharge	Cooling towers
Kewaunee Kewaunee, WI Wisc. Public Service	563 MW 1 pwr unit nuclear	6/72	4.1	Shoreline discharge	Cooling towers
Michigan City (new unit)	500 MWe 1 fossil	6/73	3	Offshore discharge & intake shoreline in interim	Cooling towers
" " (old unit)	219 MWe 1 fossil	Operating	1.5	Shoreline discharge	Improved discharge structure or cooling towers

TING PLANTS * * * Plants will also be required to install mechanical cleaning devices and to meet with respect to intake and discharge location and design. Studies will be required on plants discharging in excess of 2 billion BTU/hour.

Plants	Size & Type	Waste Heat in Cooling Water BBTU/hr Approximate Maximum Daily	Present Discharge Design	Required Modification
Waukegan, Power-Commonwealth Edison-Waukegan, IL	1043 MWe Fossil	Billion BTU/hour	Shoreline & discharge	Improved discharge structure
Winnetka Power Winnetka, IL	25 MWe Fossil	0.2	Shoreline & discharge	None anticipated
U.S. Steel South Works	105 MWe Fossil Steel Company	0.6	Shoreline discharge	Improved discharge structure may be necessary
Ft. Sheridan, Great Lakes Naval Training Center, Abbot Labs, U.S. Steel Waukegan, North Shore Sanitary District		< 0.5	Shoreline discharge	None anticipated
Michigan City-under construction Northern Ind. Public Service	219 MWe Operating	1.5	Shoreline discharge	Improved discharge structure
Bailly-Fossil	616 MWe Fossil	2.9		Improved discharge structure
Northern Ind. Public Service				
State Line-Hammond, IN Commonwealth Edison Co.	972 MWe Fossil	4.9	Shoreline discharge	Improved discharge structure
Mitchell, Gary-Northern Ind. Public Service Co.	414 MWe Fossil	2.5	Shoreline discharge	Improved dishcarge structure
Indiana Industries USS Gary Inland Steel, E. Chicago Youngstown S&T, E. Chicago American Oil, Whiting Union Carbide, Whiting		No Data Available	Shoreline discharge	Not known

ING PLANTS (Cont.) * * * Plants will also be required to install mechanical cleaning devices and to meet with respect to intake and discharge location and design. Studies will be required on plants discharging in excess of 2 billion BTU/hour.

Plants	Size & Type	Waste Heat in Cooling Water BBTU/hr Approximate Maximum Daily	Present Discharge Design	Required Modification
Big Rock-Consumers Power	75 MWe BWR Nuclear	0.5	Shoreline	None anticipated
Traverse Power-Traverse City		0.1	Shoreline	None anticipated
Cobb-Consumers Power	531 MWe Fossil	Not on Lake	Shoreline	None anticipated
Campbell-Consumers Power Co.		1.8	Shoreline	Improved discharge sturcture
DeYoung	48 MWe	Not on Lake	Shoreline	None anticipated
Escanaba Power	Fossil	0.2	Shoreline discharge	None anticipated
Oak Creek Wisc. Electric Oak Creek, WI	1670 MWe Fossil	6	Shoreline discharge	Improved discharge structure or cooling towers
Lakeside-Wisc. Electric Milwaukee, WI	311 MWe Fossil	1.5	Shoreline discharge	Improved discharge structure
Port Washington-Wisc. Electric	400 MWe Fossil	1.5	Shoreline discharge	Improved discharge structure
Edgewater-Sheboygan Wisc. Power & Light	433 MWe Fossil	3.0	Shoreline discharge	Improved discharge sturcture
Manitowoc Power	69 MWe Fossil	0.2	Shoreline discharge	None anticipated
Pulliam-Wisc. Public Service Co. Green Bay	392 MW Fossil	2.2	Shoreline discharge	Improved discharge structure
Valley, Commerce, Wells Wisconsin Electric	329 MW Fossil	Off Lake	Shoreline	None anticipated

PLANTS IN PRE-CONSTRUCTION STAGES

* * * Plants will also be required to install mechanical cleaning devices and to meet requirements with respect to intake and discharge location and design.

Plants	Size & Type	Operating Date	Waste Heat in Cooling Water BBTU/hr Maximum Daily	Present Discharge Design	Required Modificati
Nuclear Plant, Dune Acres, IN Nuclear Plant near Bailly	666 MWe BWR-Nuc	1976	4.3	Cooling towers	None anticipated
Addition to Edgewater Plant Sheboygan, WI	400 MWe Fossil	1976	2	Once-through	Closed cycle system
City of Gary Plant, IN	400 MWe Fossil	1976	2	Once-through	Closed cycle system
Additions to Most large nuclear plants	10,000 MWe	?	70	Once-through	Closed cycle system

or cooling towers.

For plants that are currently operating, Waukegan would be an improved discharge structure. Winnetka powerplant would be -- we do not anticipate that they would have to change their operation at this point. The Bailly plant -- excuse me -- missed one. Michigan City would have an improved discharge structure; the Bailly plant, improved discharge structure; the State Line in Hammond plant, improved discharge structure; the Mitchell plant, improved discharge structure.

The Michigan plants, then: Big Rock -- it would not appear that they would require modification; Traverse powerplant, no anticipated changes; Cobb--Consumer, no anticipated changes; the Campbell plant would probably have to improve their discharge structure; the Deyoung plant would probably not have to change their method; Escanaba Power, no anticipated changes; Oak Creek -- it would probably have to improve their discharge structure or go to cooling towers.

Now, we move to Wisconsin, excuse me -- the Oak Creek in Wisconsin, improved discharge structure or cooling towers; Lakeside plant, improved discharge structure; Port Washington, improved discharge structure; Edgewater, improved discharge structure; Manitowoc Power, no anticipated change;

Pulliam, improved discharge structure; Valley Plant, no anticipated changes; the unnamed plant at Dune Acres would probably be able to meet the requirements with no cooling towers although they are — excuse me, wait a minute, I misread that — the present design calls for cooling towers at that plant. Excuse me, I misread it. The addition to the Edgewater plant would require a closed cycle system; the city of Gary plant would require a closed system, and any additions to other plants would require the closed systems.

MR. STEIN: Thank you.

Are there any comments or questions?

Mr. Purdy.

MR. PURDY: Is there any significance in your change from closed cycle system to a cooling tower recommendation?

MR. BRYSON: When I mentioned cooling towers, we were talking in lieu of the once-through cooling, so we are talking the closed system; we are not talking the once-through.

MR. PURDY: Yes, because you could have a once-through cooling tower.

MR. BRYSON: Right. No, we are talking closed cycle.

MR. STEIN: When you say closed cooling tower, you mean closed cycle?

MR. BRYSON: I meant closed cycle.

MR. STEIN: Are we all clear on that?

MR. BRYSON: It is the terminology of the table —

MR. PURDY: To the extent that closed cycle recognizes some blowdown.

MR. STEIN: Yes. Let me amend that to mean essentially closed cycle. But the only thing I want to do is get understanding among the conferees.

Are there any other comments or questions?

MR. CURRIE: Yes, Mr. Bryson, what would be the effect of the EPA proposal on pump storage facilities?

MR. BRYSON: I am going to have to rely or get Mr. Howard Zar up here to explain the details of — well, let's ask Mr. Purdy to explain the details of the pump storage that they are talking about in Michigan, and let us respond to that so that everybody is aware of what we are talking about.

Let's have Mr. Purdy explain the concept of the system.

MR. PURDY: Pump storage is where, during off-peak demand load hours, you use generating capacity to operate large pumps that will pump lake water up into a reservoir at some elevation above the lake, and then at a later point in time, when you have peak loads you release that water from the reservoir and it operates these reverse cycle pumps as turbines and produced power. So from the standpoint of say heat, you do not add heat to the water to generate power, but that you do pick up some warming from the sun in that storage reservoir — or you may.

MR. BRYSON: How many degrees are you talking about? Do you have any idea?

MR. PURDY: About 2° of increase in temperature which at the release rate from the reservoir could mean about 25 billion, I guess, B.t.u. per hour.

MR. MAYO: What kind of periods of time would this be applicable, Mr. Purdy?

MR. PURDY: Maybe 2 to 3 hours.

MR. MAYO: Out of the day?

MR. PURDY: Out of the day.

MR. MAYO: Power being used for peaking purposes?

MR. PURDY: That is all it is used for is peaking purpose. That is all that you have storage capacity for.

MR. STEIN: I don't believe we have answered Mr. Currie's question. Are you in a position to do that now, Mr. Bryson?

MR. MAYO: I can answer that, Mr. Chairman.

For the purposes of this material, and for the purposes of the proposed regulation, and in consideration of the nature of the discharge at the storage plant at Ludington, it would seem to me that the requirement for the meeting of the A. 1. regulation would still be there for that discharge.

Considering the nature of the operation, the rates of discharge determined, as I understand it, 20,000 to 30,000 feet per second, the approximate 2° rise in temperature, it appears to us that the constraint that could reasonably be placed against that discharge would be the requirement that the A. 1. provision in the proposed standard be met.

MR. STEIN: Let me try to put this in possibly simplistic legal terms. If we have the A. 1. requirement, which is a maximum temperature each month and a requirement of a rise of not more than 3°, and you give them 2 a feet mixing zone, this probably could be met in the pump storage operation by appropriate intake and discharge structures rather than cooling towers. Is that —

MR. MAYO: Or closed cycle system.

MR. STEIN: Or closed cycle system. That's right. Thank you.

Does that answer —

MR. CURRIE: Is that to say that you believe that in the springtime when, according to Dr. Mount's figures, any rise outside the mixing zone is illegal that no cooling devices would be required on the storage plant?

Can you meet with the storage plant without cooling towers the zero rise at the edge of the zone?

MR. STEIN: Let's clarify the question.

As I understand it, Mr. Currie, any rise outside the zone is illegal anyway.

MR. CURRIE: It is normally said to be 3° at the edge of the zone, but not if the temperature exceeds the monthly maximum.

MR. STEIN: Whichever is less.

MR. CURRIE: And I am worried about the monthly maximum, which according to Dr. Mount in the springtime is often exceeded by natural temperatures, so that any addition at the edge of the zone during springtime is likely to be illegal.

MR. STEIN: Do you want to answer that?

MR. MAYO: That constraint would apply equally with other discharges.

MR. PURDY: I might point out the volumes of water that we might be wrestling with. This discharge during generating periods will be in the range of 60,000 cubic feet per second. So if we are looking at cooling towers on that volume --

MR. MAYO: No, Mr. Purdy, I think to the extent that a constraint would apply at a particular point in time, it may be in the nature of a refraining from the generation power for short periods of time. I think that would be the logical constraint.

MR. CURRIE: Well, if the pump storage facility is subject to A. 1., is it not also subject to B., and therefore closed cycle cooling required?

MR. MAYO: We have not considered it to be applicable to B. because of the very nature of the operation and the kinds of volumes of water, and the possible distinction between waste heat, as we had considered it in the fossil fuel and nuclear plant discharges.

MR. STEIN: Let me call your attention -- I don't want to be excessively technical -- but B. applies to all new waste heat discharges exceeding a daily average of 1/2 billion B.t.u./hour. Does this meet that requirement?

MR. MAYO: I would have to ask Mr. Zar. Just a moment.

MR. BRYSON: We couldn't hear the question.

MR. STEIN: Read B. It says, "Applicable to all new waste heat discharges exceeding a daily average of 1/2 billion B.t.u./hour."

Does that pump storage meet that or exceed it? It seems to me this is your essential point.

MR. BRYSON: Go ahead. Carlos Fetterolf, a member of the Technical Committee, discussed this at length in the Technical Committee. Let him respond.

MR. FETTEROLF: When the Technical Committee considered the discharge of heat from a pump storage facility, we did not consider this as waste heat. We considered it as naturally added waste heat.

If the Ludington pump storage facility operates for a period of 3 hours, and during those 3 hours adds 25 billion B.t.u./hour, it comes out to about 75 billion B.t.u. for 3 hours; and if you divide 24 into those 75, you come up with 3 billion B.t.u./hour as a daily average.

MR. STEIN: You figured that the word "waste" does not apply to a pump storage, that is how they are out — "... all new waste heat ..." — and this isn't waste heat?

MR. FETTEROLF: The Technical Committee considered that our charge dealt with fossil fuel and nuclear facilities, and industrial power generation, cooling waters, and we did not consider that pump storage fell into this category. After we studied it and received a good deal of information from Consumers Power Company, we decided not to consider it in our recommendations.

MR. STEIN: Okay. I think I understand you.

Are there any further questions?

MR. CURRIE: Yes, I think I understand that. But then my question is: If B. does not apply because this is not waste heat, why does A. 1. apply which also refers only to waste heat?

MR. MAYO: Well, I think, Mr. Currie, that with respect to A. 1., in our efforts to provide environmental protection in the receiving water to the extent that discharge from this plant would exceed the maximum and the related constraints, it would not be unreasonable to refrain from operating the facilities for those limited periods of time.

MR. CURRIE: In other words, the heat from a pump storage plant is just like the heat from any other plants in terms of the effect to the biota, is that correct? Heat is, after all, heat?

MR. MAYO: Heat, in terms of its impact on the biota and our opportunities to control it, I think could reasonably be subjected to the same kinds of monthly maximum constraints.

MR. CURRIE: But, then, the question arises:

why not subject it also to the closed circuit cooling requirements of B.?

MR. MAYO: I would offer the observation that the Technical Committee responded in terms of its evaluation it was not considered in the category of waste heat but it can indeed be considered in terms of the category of being controllable, and that this would represent a reasonable set of constraints for that kind of a facility.

MR. CURRIE: Well, are we going to define the problem in terms of whether it is called "waste" or not, or are we going to talk about whether it is reasonable to control this heat?

Is the reason why closed cycle cooling is not to be required on a pump storage plant, money?

MR. MAYO: No.

MR. STEIN: Well, let me try this. I think I can remember, and I hope you can, my colloquy with Dr. Mount.

If we are talking in terms of manmade heat, certainly the pump storage is manmade heat, and this is what we are talking about controlling. This doesn't happen naturally.

Now, it doesn't make any difference where this heat comes from, whether it is manmade, as far as I understand it -- and, Dr. Mount, you correct me if I am wrong -- whether it is manmade, whether it comes from the sun, whether it comes from a blockage, whether it comes from anywhere. As far as the effect on the biota, heat is heat.

But if we don't control manmade heat and we have a pump storage operation and we want to set this up as a separate category, maybe we should face that as a separate category. Maybe it is because the controls are different. If the key point, for example, is that you are going to have a critical period in the spring and in the spring you are not going to need this peaking power or we can cut off the power, maybe we will have to deal with it in a different way.

But I think the distinction is in saying when you put stuff into a reservoir, let it heat up and then you run it out, its not waste heat. But when you run it through a condenser and heat it up, it is waste heat. I don't know. If you want to accept that kind of distinction, that is all right. I find it a little difficult to take.

MR. CURRIE: So do I, and I was trying to explore the reason for distinguishing the pump storage from other plants.

MR. STEIN: Well, I think Mr. Mayo gave what I consider a practical reason if it pans out and if you agree with it.

What you are saying is that putting a large amount of water out, if you measure the heat in B.t.u.'s, the point is that just raising the temperature of this water maybe 2^o -- they are not raising it 18, 20, or 28 -- and discharging it over a 3-hour period, it may be possible (if we are dealing with what Dr. Mount is talking about) in preventing a damage to the biota, perhaps during this critical period in not using the peaking power and being able to get by with it for the rest of the year with the adroit location of discharge structures.

Now, as I understand it, perhaps we can make a distinction this way. In other words, I would suspect that we would not want to prevent the development of this facility if we could do it without hurting the biota or hurting the lake.

Maybe we need a different category. I don't know that this proposed requirement gets it because of the general term "waste heat". We may need something else to get it.

MR. CURRIE: I take it that Mr. Mayo's answer a a moment ago was not intended, when he said that money was not the reason for this exemption, was not intended to say that the cost of control is irrelevant, was it?

MR. MAYO: I want to make it clear that in reaching that distinction it wasn't based on any consideration of the magnitude of cost. It would be related to providing what you might term the corrective measures. It was made in the context of the character of the discharge, the short period of time of the discharge, and the controllability of the discharge, as being mitigating factors without consideration of the magnitude of cost for providing once-through closed cycle cooling.

MR. PURDY: Mr. Chairman, I think if this has to be controlled that Mr. Mayo offered the only practicum, and that is that you don't use it during that period of time because I really don't know of a cooling tower that could even approach cooling water down within 2° of the ambient temperature.

You have got some differential there. I would imagine that most cooling towers, the blowdown is going to be 10-plus degrees warmer than lake water when it is discharged, and here I know of no practical way by a cooling tower to get that last 2° F. out.

MR. CURRIE: Let me move to a slightly different question which I do think is somewhat related. I take it that the cost of bringing a plant into compliance with the regulation is not irrelevant. Is that right?

MR. STEIN: Who are you addressing that to, Mr. Mayo?

MR. CURRIE: Anyone who is presenting the Federal position here.

MR. STEIN: Mr. Mayo.

MR. MAYO: The cost of bringing a plant into compliance is not irrelevant, is that —

MR. CURRIE: — in determining what regulation should be adopted.

MR. MAYO: There isn't complete irrelevance, but I would like to take you back to earlier decisions on the part of this Conference — decisions on the part of the States in general — in the area of water quality standards.

The standards were adopted and they represented the best judgment of what was required to protect the public health and welfare in the way of the character of the receiving waters that needed to be maintained. The decisions were made, then, that there were subsequent remedial actions that had to be taken on the part of the individual dischargers, whether we were talking about dissolved oxygen parameters or biochemical oxygen demand or any of the other chemical parameters.

The constraint then was placed against the discharger to meet an implementation schedule, and generally the question was not asked, what is going to be the cost to the individual discharger? The proposition was offered that these are the standards; this is the implementation schedule. And then the individual discharger assumes the responsibility of meeting that requirement, and he then assumes the cost of meeting that requirement.

So, in that context, the question of finances, while not totally irrelevant, was set aside as being the burden that the discharger had to pay, and the regulatory agency, the State, placed that burden on the discharger.

MR. CURRIE: I think I have —

MR. MAYO: And we have indeed found a variety of circumstances I think where the determination was made on the part of the discharger that it might be economically impractical for him to remain in operation and pay the costs for meeting the constraints, As a consequence, he discontinued operation or the proposal was foregone.

MR. CURRIE: Well, I think I would have some quarrel with that philosophy, both as a question of what the law requires and as a question of policy.

And, in addition, I think there might be a decision drawn between what one does in enforcing existing regulations after the decision of cost has already been made and in setting the standards in the first place, which is what we are asked to do today.

In any event, I take it you are saying that cost is not irrelevant. I wonder in light of that and your impact statement as to the impact of the EPA proposal, what costs are you contemplating for the backfitting of cooling towers, for example, on the Zion plant?

MR. BRYSON: In checking with our people very quickly at noon, we do not have detailed cost figures on each facility, Mr. Currie.

In some of the plants, the cost is going to be very small. It is a matter of possibly putting in a new pump or something to increase the flow of water, as a jet type thing. On the other plants it is going to require some additional costs. We do not have the details on each individual facility.

MR. STEIN: Can you answer the question on the Zion plant?

MR. BRYSON: On the Zion we do not have detailed costs right here.

MR. STEIN: All right.

FROM THE FLOOR: Mr. Stein.

MR. STEIN: No, we are not taking any questions --

FROM THE FLOOR: May we ask -- there are a number of public representatives here today, voluntary groups, who have sat here through the morning. Now, we encourage this kind of discussion, and so on, but don't you think consideration for nonpaid people who have taken time off from work, and so on, could be given to allow them to respond to Ruckelshaus' proposal before detailed discussion of the proposal is taking place here by the conferees?

MR. STEIN: Let me tell you, we don't take comments from the floor. I certainly agree with you. I thought by keeping quiet myself I could speed things up, but I see I can't. I see the working press here and the TV. You know they have the best job in the world. It may be terrible, but you can't beat the hours. I think you have made a good point. In order to let them go, let's recess for 5 or 10 minutes, and see if the conferees can think this over, and determine if they have had enough discussion. then maybe we can call upon the States and public witnesses.

We stand in recess.

(Short recess.)

MR. STEIN: All right. Let's reconvene.

I have a couple of public announcements.

... Announcements ...

MR. STEIN: We have one question of Mr. Currie on the cost of the Zion plant. Would you try to answer that?

MR. MAYO: Yes. I believe Dr. Tichenor has available data that he can direct to that response.

STATEMENT OF BRUCE A. TICHENOR, Ph.D., CHIEF, HYDROGRAPHIC BRANCH; AND CHIEF, CONTROLS BRANCH, NATIONAL THERMAL POLLUTION RESEARCH PROGRAM, CORVALLIS, OREGON

DR. TICHENOR: For the record, I am Bruce Tichenor.

I believe the question related to the cost of backfitting the Zion nuclear powerplant. I think the most comprehensive data which are available on this were presented to the Illinois Pollution Control Board during their hearing of November 5, 1970. This statement was presented by Mr. O. D. Butler, Vice-President of Engineering for Commonwealth Edison.

Mr. Butler was kind enough to provide us with a copy of this statement plus additional backup information, and I think the best thing I could do here in terms of relating the cost of backfitting would be to make some comments upon these costs. Now, these costs as presented by Mr. Butler are a matter of record. I should also mention that this information that I am going to present here was prepared in the form of a memorandum to the Great Lakes Regional Office from our Corvallis laboratory.

I also believe that each one of the members of the Enforcement Conference have received a copy. Is this true?

MR. STEIN: Dr. Tichenor, I want you to explain this fully, but I would like to say before we go on with this I thoroughly agree with the man who got up in the audience. You know, the people up here as well as you, I hope, are getting a salary and probably per diem for every day we are here. The people from the industry are probably getting paid, too. We have a lot of people in the audience who have come here at their own time and expense, and I hope we can make this as short as possible to get on with the public presentations. (Applause)

DR. TICHENOR: If it would be agreeable to Mr. Currie, then, I would just place this statement in the record without reading it.

MR. STEIN: Can you summarize it very briefly?

DR. TICHENOR: Well, I can summarize it. How briefly, I don't know.

But essentially what we did --

MR. STEIN: Go ahead.

DR. TICHENOR: -- we looked at the data provided by Commonwealth Edison, and we tried to make some judgment as to not necessarily its accuracy -- I don't want to demean their engineering abilities -- but we looked at the data to find out if there were better systems that might be built for that plant.

We also looked into the data available on backfitting at their powerplant.

I just have two references. One of them was presented at the Joint Committee on Atomic Energy (Hearings on Environmental Effects of Producing Electric Power.) It is in Part 2, Volume 1 of those hearings. And the Edison Electric Institute data presented there, and I quote here.

It says that: "... retrofitting on an existing plant ..." is $10 to $12 per kilowatt.

Data presented by Mr. D. H. Williams at the September 1970 workshop session for the Donald C. Cook nuclear powerplant come out to be a total cost of $20 million which is $9.5 per kilowatt for the cooling facilities themselves plus an additional $12 million for the pumping and transport system. That is $6.7 per kilowatt.

So the total dollars per kilowatt there is on the order of $9.5 and $6.7 is $16.2 per kilowatt.

Now, the data presented by Commonwealth Edison was in two parts, one for a dry system, one for a wet system. I have to look those numbers up. The dry system came out to $228 per kilowatt; the wet system came out to $53 per kilowatt. So we have to just put these things in perspective.

First of all, I would like to make a comment about the dry system. I really think that while the numbers are very interesting, I think the use of a dry system in backfitting such a plant as Zion with the type of tube condensers they are now using is really not a practical solution to the problem.

In fact, again, Mr. Williams, during the 1970 Conference or workshop session of this Conference indicated and I quote -- well, he said that "backfitting," and I quote --"is totally out of question." So I would have to agree.

Now, in terms of the wet system, the data presented by Commonwealth Edison is for a unique sort of cooling tower. It is really a hybrid wet mechanical natural draft tower. The reasons they went to this are spelled out in their statement, and they wanted to get up high enough so that the fog would not be a problem, but they couldn't get up too high because of other height restrictions so they settled on a tower which was -- I believe -- 250 feet tall and was a very unique design.

So, from our point of view, it was very difficult to determine what the actual costs of this device might be, although costs given here may be appropriate.

Another point which may be open to question is the assignment of capability losses and assigning a value of the $207 per kilowatt, where we feel that maybe the use of a lower cost gas turbine peaking unit at $100 per kilowatt might be appropriate.

I think the best thing I could do is just kind of give a summary of our conclusions. I will just read this:

"In conclusion, we believe that Commonwealth Edison's cost estimates for backfitting the Zion plant with a closed cycle cooling system reflect excessively strict design assumptions and are thus too high. While the total plant cannot be optimized, certainly alternative backfitted systems and operating techniques could be evaluated to minimize the economic impact of installing such systems. In this respect, the following evaluations should be made for conventional wet towers:

"1. A more rigorous evaluation of the fogging potential of conventional wet mechanical draft towers.

"2. Feasibility studies and cost estimates for wet mechanical draft tower fog control during critical meteorological conditions."

Now, the reason we recommend this is that if they could go to conventional wet mechanical draft towers, the cost of these devices would be reduced significantly.

The fourth one is: "An evaluation of the economic benefits derived from increasing the capability of the plant.

"5. An evaluation of the use of low cost gas peaking units to be used during periods of capability loss."

And, finally, that the last data presented by Commonwealth Edison reflected the increase in cost to the consumer. Without going through all of the details we found that it seemed to us, at any rate, that Commonwealth Edison was putting an undue burden on the residential consumer and the way we figured it, even using Commonwealth Edison's capital cost data, our figures came out about half the monthly cost to the consumer that theirs had.

So I would say here that Commonwealth Edison should provide data which more realistically reflect the increasing cost which their residential consumers will bear. In this respect, an evaluation of the portion of of industrial load which will be passed to consumers outside the Commonwealth Edison service district would be most valuable.

I would like this total thing read into the record.

MR. STEIN: We will put that into the record.

(The document above referred to follows in its entirety.)

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27
5010-108

UNITED STATES GOVERNMENT

Memorandum

TO : Director, Office of Enforcement and Cooperative Programs, Great Lakes Region, EPA, WQO

DATE: January 15, 1971

THRU : Chief, National Thermal Pollution Research Program

FROM : Chief, Hydrographic Branch and Chief, Controls Branch, National Thermal Pollution Research Program

SUBJECT: Costs of Backfitting at Zion Nuclear Power Plant

As requested by your memorandum of November 25, 1970, we have evaluated the comments and data which Mr. O. D. Butler of Commonwealth Edison presented to the November 5, 1970 meeting of the Illinois Pollution Control Board. In addition, Mr. Butler sent us a portion of the "back-up" material used in deriving their cost estimates. These data are enclosed for your files.

While admitting the fallacy of comparing cooling system cost data for optimized plant designs with cost data for back-fitted plants, Mr. Butler himself does just that. He compares the data contained in our report on the "Feasibility of Alternative Means of Cooling for Thermal Power Plants Near Lake Michigan" to the estimates he provides for backfitting the Zion plant. In our view this is unjustified.

Limited data on backfitted cooling facilities are available. For example, EEI presented data to the Joint Committee on Atomic Energy (Hearings on Environmental Effects of Producing Electric Power, Part 2, Vol. 1, page 1823) which showed that the cost of providing "thermal effect control" using wet towers by "retrofitting on an existing plant" is $10 to $12 per kilowatt. In this same reference EEI contends that retrofitting with dry towers is "probably not possible." In his statement before the September, 1970 Workshop Session of the Lake Michigan Enforcement Conference, Mr. D. H. Williams, Assistant Vice President and Chief Mechanical Engineer, American Electric Power Service Corporation, provided estimates on backfitting the Donald C. Cook nuclear power plant. He suggested that three natural draft towers, each 500 feet tall and 400 feet in diameter would be required for the 2 unit, 2100 MWe plant at a total cost of 20 million dollars ($9.5/KW). An additional 12 million dollars ($5.7/KW) would be required for "the pumping and transport systems through the cooling towers and back to the plant." In addition, Mr. Williams estimated that summertime conditions would increase turbine back-pressures from 2.9 inches of mercury to 4.3 inches of mercury"...causing a load curtailment of approximately 40 MW per unit or some 80 MW for the total plant." Mr. Williams felt that dry towers "...are totally out of the question" for the Cook plant.

While it is difficult to compare the specific cost items provided by Mr. Butler with these more general data, it does appear that the Commonwealth Edison costs are excessive. For example, excluding special earth work, the total capital investment costs for Zion's wet system equals $28/KW compared to the $12/KW EEI value and the $15/KW figure given by Mr. Williams. In terms of capability loss, Commonwealth Edison's estimate for Zion of 179 MW is more than twice as much as the 80 MW figure provided for the D. C. Cook plant by Mr. Williams. Thus it seems evident that Commonwealth Edison has imposed some extreme constraints to come up with their estimates. It would be impossible to examine in detail all relevant items appearing in their cost list, but several factors can be discussed:

(1) Dry Cooling Towers

A prime example of an unsound groundrule is the decision to backfit an existing plant with a dry cooling system. Mr. Butler presents cost data for a technically possible but economically unrealistic dry cooling system. Dry cooling systems for large power plants will not use standard surface condensers. Direct contact condensers in combination with turbines operable at high back pressures are required. As Mr. Butler notes, such a configuration would provide much lower cooling system costs than that shown in Exhibit C. We would agree with Mr. Williams and assert that backfitting with dry cooling towers is "...totally out of the question."

(2) The Hybrid Wet Mechanical-Natural Draft Cooling Tower

The constraints leading to the selection of a non-conventional, hybrid wet cooling tower are examples of other unduly restrictive assumptions. For example, conventional mechanical draft towers were not selected because of possible fogging. While the potential for fog problems exists at the Zion site, the selection of a unique and untried cooling device costing millions of dollars more than conventional units is based on supposition rather than hard facts. The analysis of fog potential presented in our feasibility report indicates that meteorological conditions leading to a high probability for fog occur less than 1 percent of the time near Zion. A more rigorous analysis of the potential for fog from conventional mechanical draft towers would be advisable, especially since the cost savings would be substantial if conventional units were practical.

If it is found that fog problems are severe enough to cause visual obstruction on highways or in populated areas, an evaluation of fog control measures should be made. Since the potential for fog problems exists only during a small portion of the year, the use of fog control devices at the towers may be practical. Heating the air-water vapor tower effluent can prevent the formation of an extensive visible plume. Also, variations in cell loading and number of cells per tower should be evaluated. The capital and intermittent operating costs of fog control measures may be substantially less than the increased costs of the hybrid tower system.

The use of a 250 feet limit on tower height is based upon the heights of other obstructions around the Waukegan airport. There is at the present time an FAA regulation limiting the minimum altitude approach to that airport at 600'. It may be possible that FAA would consider modifying this regulation to allow for the presence of a natural draft tower in the vicinity of the airport. Since the overall cost of conventional natural draft towers would be millions of dollars less than the hybrid system, such an investigation would be prudent.

(3) Capability Losses

A major cost item in the data supplied by Mr. Butler is for capability losses due to lower efficiency at high back-pressures and auxilary power required for pumps and fans. Mr. Butler assigns a value of $37,142,000 to this capability loss for the wet mechanical draft tower system (179 MW x $207/KW). In assigning an equivalent capital investment figure of $37,142,000 to this capability loss, it is obvious that the economic benefits of additional capacity during the non-critical weather conditions were not evaluated. Using economic data provided by Commonwealth Edison and assuming that an additional 150 MW would be available for distribution 75 percent of the year at the stated 70 percent capacity factor, we computed that at power value of 5 mills/KWH the equivalent capital "gain" over the 30 year plant life would be $23 million. Thus the net cost penalty due to capability loss should be $14 million ($37 million minus $23 million). In the event that the extra capability of the plant is not able to be sold then Commonwealth Edison should seriously consider the use of lower cost gas turbine peaking units which would provide the needed capability during the relatively short periods of time when severe summertime weather cause excessive capability losses. At $100/KW the use of these units would make the equivalent capital investment for capability loss $17.9 million rather than $37.1 million. Thus, in either case, it appears that the value assigned to capability loss is excessive.

(4) Top Charges

Top charges are assigned at a rate of 12-1/2 percent of the total capital investment costs. Naturally, if these capital costs could be reduced by selection of more conventional systems, the top charges would also be reduced.

(5) Cost to the Consumer

In Exhibit E, data are presented which show the additional monthly cost to the residential consumer is 68¢/month for the wet mechanical draft cooling tower system. This occurs when the burden of the total increase in Zion's production cost is distributed over Commonwealth Edison's 2.31 million residential consumers.

In our opinion the residential consumer in the Commonwealth Edison service district is being unfairly asked to bear the total burden of cost (see *1. on Exhibit E). In 1969 residential consumers accounted for 24.5 percent of the total KWH's sold by Commonwealth Edison. Industrial consumers used 39.9 percent and commercial consumers 23.3 percent; the remainder going to losses. If we assume that the residential consumers of Commonwealth Edison also consume 100 percent of the goods and services provided by the industries and commercial establishment in the service district, then the method used by Mr. Butler to assign the cost increase is correct. However, it seems highly unlikely that this is the case. Heavy industrial goods produced in the Chicago area are sold throughout the U.S. and even the world and any product cost increase due to increases in power cost would be distributed to these wide ranging customers. Also the Chicago area supplies commercial services to large numbers of people which do not buy residential power from Commonwealth Edison. In addition, one should evaluate the cost increase on the basis of 1973 consumers rather than 1969 consumers since Zion will only then be fully "on-line."

Assuming that the residential consumers of Commonwealth Edison purchase 20 percent of the output of industrial goods and 75 percent of the commercial services of Commonwealth Edison's industrial and commercial customers one can show that the residential consumer should pay only 24.5 percent + (0.2) (39.9 percent) + (0.75) (23.3 percent) = 50 percent of the cost increase, whatever that true cost may be. At any rate, the 68¢/month or 6.5 percent cost increase to the residential consumer is unrealistically high.

In conclusion, we believe that Commonwealth Edison's cost estimates for backfitting the Zion plant with a closed cycle cooling system reflect excessively strict design assumptions and are thus too high. While the total plant cannot be optimized, certainly alternative backfitted systems and operating techniques could be evaluated to minimize the economic impact of installing such systems. In this respect, the following evaluations should be made for conventional wet towers:

1. A more rigorous evaluation of the fogging potential of conventional wet mechanical draft towers.

2. Feasibility studies and cost estimates for wet mechanical draft tower fog control during critical meteorological conditions.

3. An evaluation of the cost of raising the minimum approach to Waukegan airport to allow conventional wet natural draft towers.

4. An evaluation of the economic benefits derived from increasing the capability of the plant.

5. An evaluation of the use of low cost gas peaking units to be used during periods of capability loss.

Finally, Commonwealth Edison should provide data which more realistically reflect the increase in cost which their residential consumers will bear. In this respect, an evaluation of the portion of industrial load which will be passed to consumers outside the Commonwealth Edison service district would be most valuable.

Bruce A. Tichenor

Bruce A. Tichenor

Mostafa A. Shirazi

Mostafa A. Shirazi

Enclosures

cc: Bartsch
Stein

DR. TICHENOR: Does that answer your question?

MR. CURRIE: What was Commonwealth Edison's estimate of the total cost of wet backfitting at Zion?

DR. TICHENOR: I will have to look. It is on the order of — I have their first one; they did make a revision — I believe it was on the order of $116 million.

MR. CURRIE: And your estimate?

DR. TICHENOR: We don't have an exact estimate.

MR. STEIN: Didn't you say half?

DR. TICHENOR: No, the half has to do with the increase in cost to the consumer.

MR. STEIN: What is the increase in cost that Commonwealth Edison figured they would have to have for the consumer?

DR. TICHENOR: Well, again, these values have been revised by Commonwealth Edison. I don't have the revised values with me. I believe their increase in cost to the consumer for mechanical draft wet towers was 68 cents.

MR. STEIN: Sixty-eight cents per average bill a month?

DR. TICHENOR: Per month, yes.

MR. STEIN: And you figured —

DR. TICHENOR: It would be about half of that.

MR. STEIN: Thirty-four?

DR. TICHENOR: Something like that, yes.

MR. STEIN: All right. Thank you. I think that is the thing you want.

DR. TICHENOR: Let me answer Mr. Currie a little more. It is really very difficult to determine the cost of backfitting unless you go through a complete engineering evaluation and we have not done that with the Zion plant.

MR. CURRIE: Are they likely to be off by as much as the factor of 10?

DR. TICHENOR: I don't believe so, no.

MR. CURRIE: So we are talking maybe $20, $30, $40 million in your figures for backfitting the Zion plant?

DR. TICHENOR: Yes, that probably would bracket it.

MR. CURRIE: Do we know, especially in the light of Dr. Mount's statement, that what we are worried about is the proliferation of a large number of plants, that it is worth $20 to $40 million to backfit Zion?

DR. TICHENOR: Are you asking me that question?

MR. CURRIE: I am asking those who advocate the Federal position that question.

MR. MAYO: It is our position that — I think it was very frankly stated in Mr. Ruckelshaus' recommendation that for the plants currently under construction not yet in operation that there be a requirement that these facilities use other than once-through cooling. I think that was very pointedly stated in the Federal position. It addresses itself to all of those plants under construction and not yet in operation, including Zion.

MR. CURRIE: I was just wondering what quantification of the benefits of cooling towers we had to balance against the cost which would be inflicted?

MR. MAYO: The same kind of a quantification of benefits we had when we established water quality standards that were applicable against all of the municipalities, all of the industries. It is just the same approach.

MR. CURRIE: Well, I have a different question with regard to the impact statement as to Waukegan. It is suggested that adoption of the proposed standard would require only an improved discharge structure there, and I wonder, Dr. Tichenor, is that based on -- on what assumption as to the location of the fixed point adjacent to the discharge from which we measure the 1,000 feet is that based?

DR. TICHENOR: I didn't make that evaluation. Someone else would have to answer that question.

MR. STEIN: Why don't you do it right from here. Save yourself some time.

FROM THE FLOOR: Mr. Stein, it is getting very late.

MR. STEIN: I am sorry. I told you I sympathize with you — I am just the Chairman. The conferees represent the State and the Federal Government. You can see for yourself what they want to do. I have made the point that they are in charge of this. I am not going to cut them off.

FROM THE FLOOR: Well, we are telling you what we would like to do.

MR. STEIN: I understand it, and so would I. I would like to do what you would like to do, but I am governed by the conferees.

FROM THE FLOOR: Can we have a guarantee from the conferees that they will allow the public to speak — all of us here — tonight before we go home, before everybody goes home, that all of the public witnesses will be allowed to speak?

MR. STEIN: No, you are not going to have a guarantee. My responsibility is toward this reporter here who has been working since 9:00 o'clock this morning.

Go ahead.

FROM THE FLOOR: Your responsibility is toward the public, Mr. Stein.

MR. STEIN: That is right. And I would suggest that if you want us to proceed in an orderly manner -- you heard that I sympathize with your point of view -- if you keep doing what you are doing and interrupting, you are just prolonging this.

Mr. Bryson.

MR. BRYSON: While I am walking over here, can you repeat the question?

MR. CURRIE: Yes. The statement as to the impact of the EPA proposals on existing facilities says with regard to Waukegan that all that would be required is improved discharge structures and not a cooling tower.

I wonder what the assumption was on which that conclusion was based with regard to the question of the location of the fixed point adjacent to the discharge?

MR. ZAR: I think the assumption was that the company would be allowed to place the circle of 1,000 foot radius at its convenience at some fixed point.

MR. CURRIE: Is it also assumed, as I think Dr. Mount said, that during some months -- paragraph A. 1. -- will require a zero rise from ambient at the edge of the zone in the springtime?

MR. ZAR: No.

I think the improved discharge structure requirement refers only to the 3° rise.

MR. CURRIE: Only to 3 degrees?

MR. ZAR: That is correct.

MR. CURRIE: But there is the additional requirement that we not exceed the monthly maximum at the edge of the zone.

MR. ZAR: That is correct.

MR. CURRIE: So that this is not a full explanation of the possible effect of this on Waukegan?

MR. ZAR: If on that occasion during the year when the water temperature was near the temperatures of the maximum monthly table, then it would not be a complete evaluation, that is correct.

MR. CURRIE: And is it also true that if improved discharge structures were built, but no cooling towers put in, this wouldn't help us on the problem of the organisms drawn through the condensers?

MR. ZAR: Of itself, that is correct.

MR. STEIN: Are there any other questions or comments?

Do we have any more on the Federal presentation?

MR. PURDY: Mr. Stein, I would waive any questions at the moment with the hope that the Federal witnesses would stay available.

MR. STEIN: They will stay available.

For the present time, that concludes the Federal presentation. We will keep the people available to answer questions later.

We will proceed with the States. On my right, as I indicated before, we will start with Michigan, and we will give each State an opportunity to make one statement and go on, or call on someone to make one statement and go on to the next.

Mr. Purdy.

MR. PURDY: Is Mrs. Harry Janis, Chairman of the Lake Michigan Inter-League Group, the League of Women Voters, here?

Mrs. Janis.

STATEMENT OF MRS. HARRY JANIS, CHAIRMAN,
LAKE MICHIGAN INTER-LEAGUE GROUP,
LEAGUE OF WOMEN VOTERS, CHICAGO, ILLINOIS

MRS. JANIS: Thank you. It pays to come from a far distance and be represented by the far right end of the table.

I am Mrs. Harry Janis, Chairman of the Lake Michigan Inter-League Group of the League of Women Voters.

League membership and participation in the Group is from the Illinois, Indiana, Michigan and Wisconsin areas of the Lake Michigan Basin.

Leagues in the Lake Michigan Basin are agreed that the possible delerterious effects of thermal additions to Lake Michigan far outweigh any possible beneficial effects. For this reason, we request that some form of cooling be required for all powerplants now under construction or planned for the future. The technique of such pre-cooling can be determined by the engineering needs of the plant location, but we are agreed that once-through cooling must be prohibited.

We are further agreed that no radioactive wastes should be discharged to the lake and that stack emissions must be reduced to the minimum which is technically feasible.

The recent agreement between Consumers Power Company, conservation groups, and the Atomic Energy Commission regarding the operational permit for the Palisades Plant, South Haven, Michigan, includes a prohibition on thermal wastes and the elimination of all radioactive effluent. This agreement we hope sets the precedent for recommendations from this conference.

League members believe that the watershed, or airshed, approach to environmental problems is essential for the protection of Lake Michigan. We encourage the continuing operation of the Four-State Enforcement Conference or another regional entity which would guarantee a public forum. If the question of standards controlling thermal discharges is at least temporarily solved by the President of the Palisade plant agreement, there are many other subjects which demand a regional approach, and control, i.e. dumping, dredging, pesticides, land fills, mercury, industrial pollution, to name just a few.

League members in the Lake Michigan Basin have been studying the possible effects of powerplants on the Basin. In recognizing the many alternatives in choosing types of power sources, discussion was not limited to nuclear powerplants which, of course, did bring up the particular subject of thermal effluent.

Except in the instance of particular members, League members do not claim expertise in technical areas. They are, however, well-informed, intensively concerned, and want answers with technical back-up and not projected suppositions. We turn to experts, such as yourselves and your staff, for this type of research and research analysis. Provision should be made incidentally in these studies for public representation of all technical committees. The League in Elm Grove, Wisconsin, sent in a statement which, I believe, sets the background for our approach to environmental problems. They wrote, "The course of this study and discussion brought this League to strong agreement on some broad principles. We feel that all action in the area of environmental quality should be directed toward preserving or bettering our environment and that policy should be designed to prevent deleterious effects on the environment which can reasonably be predicted on a scientific basis."

Specifically, League members want effective high standards for Lake Michigan. Because of the interstate character of the lake, the prime responsibility for the determination of these standards should be at a Federal level with participation by the responsible regional and state governments. We think that Federal standards should be sufficiently high to protect the lake. Federal standards would preempt state standards which are not equally as high, or higher. The States and/or regional agency with the resources to do the job should be responsible for enforcement with supervision and intervention by the Federal Government to ensure prompt and strict compliance.

The public must have the opportunity to participate at each step in setting standards. There should be well-publicized hearings before land is purchased (with options to purchase land beforehand to protect inflationary land speculation on the land involved) before construction starts, and before operations begin. All levels of government and the public should participate in the granting of permits.

As we have heard today in so many ways, there is an urgent need for impartial studies and research on all methods of power generation and techniques to alleviate any adverse impact on the total environment. There should be impartial analysis, coordination and cooperation in these projects to eliminate duplication and to guarantee free exchange of information. The regional approach should be considered in all planning, land use projections, population density studies and the projection of other multiple uses.

An overwhelming majority of local Leagues in the Basin asked that consideration be given to the limitation of the use of the Lake Michigan shoreline as the site for future powerplant production. Because of the technology now available to transmit power for longer distances, many League members suggested inland sites with low population density and the incorporation of closed cycling and/or onshore cooling techniques.

The increasing demand for power was recognized, but League members urge development of techniques to limit the consumption of power. The "better life" may be here to stay but the need to preserve Lake Michigan is here.

Mrs. H. Janis

Consumer education is one way of encouraging the reduction of power demands instead of the consumer-selling job that is now being done to encourage the use of electricity and electric appliances.

To encourage the reduction of electricity, rate schedule adjustments should be studied to discourage unnecessary usage without penalizing low-income families and without putting undue hardship on industrial needs. Whether it would actually limit consumption was questioned, but it was suggested that the extra rates could pay for "clean" operations and necessary research, not for extra profits.

The public has been exposed to all of the conflicting reports and projections as to the effects -- beneficial or deleterious -- of thermal effluents. Everyone is aware of the possible uses of heated water and also aware of the possible ecological damage in long-range projections. League members cannot predict how research will decide the issue, but they do urge protection for the immediate future. One League writes back with the recommendation urging "prevention before damage, not a cure after damage". Wilmette League suggests, "For now, cool it." Lake Michigan is too important for all uses to the 13,000,000 people in the Basin to be subjected to uncertain experimentation.

The type of cooling system should depend upon the specific site under discussion. Onshore, closed cycle techniques should be encouraged. Wide margins of extra-protection should be incorporated in the construction of new or enlarged plants. Meeting just minimal standards is not considered to be enough. Plans for complete elimination of heated effluent should be required for new plants and sufficient land should be acquired to make the implementation of these plans feasible.

Thermal effluent should be measured at the point of discharge for easy identification of the heat source and a constant record of heat discharged. Measurement at points within the mixing zone, outside the mixing zone, and at other points in the lake should be taken for research and study purposes. One League suggested comparing temperatures at these points with temperature readings which existed for a long period of time before the plant commenced operations. The emphasis on research, planning and study was visible over and over again.

Although this Conference is particularly concerned with thermal standards, the use of nuclear power requires simultaneous attention to radioactive emissions. The long-range, still unknown effects of radioactive emissions on the food chain and on the entire ecosystem are of intense concern to League members. Extra unnatural exposure to radioactivity can possibly cause genetic or health abnormalities. If there is such an effect, it would not be a reversible source of trouble. Similar to pestisides, mercury or other pollutants, it would be in the water to stay.

League members want -- and I'm sure everyone else does, too -- the environment and all of its inhabitants to have the highest possible protection from radioactive emissions in air or water. They encourage research on new types of power development as quickly as possible and the application of the known technology for maximum protection now.

The problem of the transportation and disposal of radioactive wastes is acute. Where and how should these wastes be stored? How can these wastes be safely transported to disposal sites? How long must surveillance be maintained?

As League members, we will work to educate our communities on the need to protect Lake Michigan. As consumers, we are willing to pay the price.

Thank you.

MR. STEIN: Thank you, Mrs. Janis. (Applause)

Do you have any comments or questions?

I have one, and I want to thank you very much because you have something in your statement that I have been trying to sell to the professionals practically every day for 6 months or a year, I haven't been able to get this across and you put this as well as anyone. I want to thank you for putting this in.

That statement is: "Thermal effluent should be measured at the point of discharge for easy identification of the heat source and a constant record of heat discharged. Measurement at points within the mixing zone, outside the mixing zone, and at other points in the lake should be taken for research and study purposes."

I want to thank you very much.

MRS. JANIS: Thank you.

MR. STEIN: It is indeed anomalous to have a League person put out something that I have been trying to get across.

MRS. JANIS: Thank you.

MR. STEIN: Let us go on.

MR. MILLER: Mrs. Jack Troy, Munster, Indiana, President of Save the Dunes Council.

MRS. BOTTS: Mr. Chairman, Mrs. Troy was unable to remain. I have been requested by three Indiana groups to submit their statements for the record.

I am Mrs. Lee Botts, Executive Secretary of the

Lake Michigan Federation, which is a clearing house for conservation and citizen groups in all four States around the lake.

I will not take time to read all three of these statements because of the time -- the short time remaining for the rest of the public.

All three statements call for protection of Lake Michigan from waste heat from nuclear plants. The statements are from the Save the Dunes Council; the American Association of University Women, Indiana State Division; and the Lake County Council of Conservation Clubs and Affiliates, Inc.

Thank you.

MR. STEIN: Without objection, all of these statements will be entered into the record as if read.

(The documents referred to above follow in their entirety.)

ONORARY PRESIDENT:
SEN. PAUL DOUGLAS
PRESIDENT EMERITUS
AND FOUNDER:
MRS. JAMES H. BUELL

Save the Dunes Council
ORGANIZED IN 1952

PRESIDENT:
MRS. JACK M. TROY
1512 PARK DRIVE
MUNSTER, INDIANA 46321
PHONE 219-838-5843

ENFORCEMENT CONFERENCE MARCH 23, 1971
Chicago

To Environmental Protection Agency:

The Save the Dunes Council urges that the federal government assume its share of the burden of protecting Lake Michigan by proposing a definite thermal standard and waste disposal limits that would apply to all state areas involved.

The Council has a record of long and costly experience in trying to battle against gread odds to save the shores and waters of Lake Michigan from harmful and despoiling use. Our best help has always come from federal agencies rather than state and local officials. But any gains have had to involve persistent and intelligent study and action by individual citizens and groups. We are cheered at some of the recent gains made in influencing utility companies to take steps that seem to be in the public interest with regard to reducing the threat of raising lake temperatures and contaminating wastes.

In our view the time is now for strong action by the government to back up the gains won by citizens with respect to avoiding the loss of our four-state major resource--Lake Michigan. Sylvia Troy **SAVE THE DUNES COUNCIL**
Mrs. Jack Troy, President

AMERICAN ASSOCIATION OF UNIVERSITY WOMEN
Indiana State Division

Statement to the Enforcement Conference, March 23, 1971, Chicago

To The Environmental Protection Agency:

The Indiana Division of the American Association of University Women as part of a nationwide endeavor to recognize, rescue, and protect environmental assets, wishes to add its voice to the plea for federal government help in saving Lake Michigan. We hope you will come at this conference to a decision to propose a definite and adequate thermal and water cleanliness standard that will protect the lake against misuses.

There is not time in saving the lake to wait for the delay of state legislatures to act individually or cooperatively to keep further harm from occurring. We have worked in Indiana with indifferent results to persuade our legislators and local officials to take protective action. In light of the decisions of utilities in Michigan and Indiana to respond to citizen persuasion to take measures to protect the lake, we think it is prime time for building on that example.

We hope the federal government itself will take the responsibility of holding the line for the good of the environment and the general public--set standards and help make them enforceable.

INDIANA DIVISION, AAUW
per Mrs. L. W. Bieker, Division Board
1154 Ridge Road
Munster, Indiana 46321

Helen K Bieker

Lake County Council of Conservation Clubs and Affiliates, Inc.

Dedicated to the Preservation of Our Natural Resources

J PECK
4526 PIERCE ST
GARY IND 46408

March 17, 1971

Lake Michigan Federation
53 West Jackson Street
Chicago, Illinois 60604

To Whom It May Concern:

Lake County Council of Conservation Clubs and Affiliates, Inc., wish to go on record with your 4 State Council, that we are opposed to Thermal Pollution to Lake Michigan. We favor regulating water temperature one degree either way of Lake Michigan.

Very truly yours,

Edwin Neimeyer
Edwin Neimeyer
President

Joseph A. Peck
Joseph A. Peck
Secretary

MR. BLASER: We have a number of requests and I am just taking them in the order that they have written in or they have been given to me. First is Mr. Henry G. Zander. Is he present?

Mr. Zander.

STATEMENT OF HENRY G. ZANDER, III,
PRESIDENT, EVANSTON-NORTH SHORE BOARD
OF REALTORS, CHICAGO, ILLINOIS

MR. ZANDER: I am Henry G. Zander, III, and I am here in the capacity of President of the Evanston-North Shore Board of Realtors.

Gentlemen, the Evanston-North Shore Board of Realtors is exceedingly distressed at the failure of the Federal and State participants in this Enforcement Conference to agree upon and impose a thermal discharge standard regulating the release of heated water into Lake Michigan.

Such a standard should protect the ecology of Lake Michigan and the health of aquatic and land biota — including man — which depend on the lake. The standard should also permit an orderly expansion of electrical generating capacity to serve the needs of industries and residents in the Lake Michigan basin.

H. G. Zander

The 1,100 members of the Evanston-North Shore Board of Realtors -- and their families and customers -- live and work in the basin. The basin's ecological integrity and energy needs are both of vital concern to the Board.

We are not scientists. We don't know what the thermal standard should be. We realize that scientists cannot agree among themselves on what the standard should be because there has been no concerted research effort to determine precisely to what extent and under what conditions Lake Michigan can tolerate heated water discharges.

This kind of research should have been undertaken years ago. The need for it is generally recognized now, but now we cannot wait for it. A standard must be set at once because energy needs are increasing at a rapid rate throughout the Lake Michigan basin and nuclear powerplants must be built to satisfy much of the increase in demand for electricity. The utlity companies are building these plants right now, but in most cases facilities for control of heated water discharges are not being incorporated in these plants.

The utility companies (with the exception of one firm in Indiana which has announced plans for cooling towers before undertaking construction) have not been willing to control heated water discharges from their plants. The utilities are waiting for someone -- for this Enforcement Conference -- to tell them that they have to control heated water discharges.

By delaying adoption of a thermal standard, this Enforcement Conference is merely ensuring that consumers ultimately will have to pay more for electricity. We understand that Consumers Power Company in Michigan will spend $10 million for cooling towers and a system to reduce radioactive emissions at its Palisades plant. Conservationists have bludgeoned C.P.C. into doing this by successfully delaying approval of an operating license for the Palisades plant, which has stood idle since last spring at a cost of between $10 and $15 million. C.P.C.'s customers will pay higher rates for electricity because the plant stood idle -- because the company didn't install equipment to protect the environment until forced to do so.

Similar delays and legal maneuvers will undoubtedly occur on a plant-by-plant basis around Lake Michigan in the absence of a thermal standard.

The Evanston-North Shore Board of Realtors is concerned that a situation similar to the Palisades case may develop when Commonwealth Edison Company is ready to begin operating the first nuclear reactor at Zion next year. Edison says its reserve capacity is now about three percent -- a level which the U. S. Office of Emergency Preparedness and the Federal Power Commission consider dangerously low. We fear that Edison's reserves may be even lower next year, and that the Zion plant will mean the difference between an adequate power supply and a power crisis of catastrophic proportions in the North Shore area where we and our real estate customers depend on Edison's ability to meet our electricity needs.

Last summer our Board of Realtors wrote to Clarence Klassen and Walter Hickel to urge that the thermal question be settled as soon as possible so that any modification to the Zion plant which might be necessary to meet a thermal standard could be made in the course of construction with a minimum of delay.

Because no standard was set, the Zion plant is now almost a year closer to being completed. Modifications will undoubtedly be much more difficult and costly to make now, but, if a standard is imposed at this time, modifications should be easier to make now than when the plant is finished and ready to operate.

We are calling for imposition of a potentially imperfect standard now. We recognize that, but we feel it is essential that action be taken now. What's more, we believe the standard should be strict enough to provide a "cushion" against the possiblity that future scientific evidence may dictate further modification of nuclear generating plants. It would be disastrous to under-control thermal discharges now and then go back later to install additional controls and disrupt the orderly expansion of electrical generating capacity. In our view, it is better to run the risk of over-controlling now. After all, what's at stake is nothing less than the preservation of our most vital natural resource -- Lake Michigan.

On behalf of the entire Evanston-North Shore Board of Realtors, I thank you for giving us the opportunity to tell you of our position on this critical question.

Thank you.

MR. STEIN: Thank you. (Applause)

Are there any comments or questions?

If not, may we call on Wisconsin.

MR. FRANGOS: Mr. Chairman, conferees, I will ask the indulgence of the Wisconsin people who indicated that they wanted to participate in the Conference proceedings today. However, I do have a statement of Governor Lucey that I would like to read into the record. It is a short statement and will not take very much time.

I also have a few short comments of my own to offer, and then I would suggest perhaps we defer any discussions so that we can proceed with the public sector of these proceedings.

However, I will remit to the conferees as to how they want to proceed.

This is a statement by Governor Patrick J. Lucey at the Lake Michigan Enforcement Conference March 23 and 24.

STATEMENT OF THE HONORABLE PATRICK J.
LUCEY, GOVERNOR, STATE OF WISCONSIN,
PRESENTED BY THOMAS FRANGOS

MR. FRANGOS: "The State of Wisconsin cannot afford to gamble with the future of Lake Michigan. Scientific evidence indicates that heated effluents may cause serious damage to the quality of Lake Michigan and the life it supports. All necessary precautions must be taken to prevent irreparable damage to Lake Michigan.

"The primary sources of heated effluent entering Lake Michigan are the electric power industries. Almost one-half of the water used in the United States is for industrial cooling with the electric power industry using 70 percent of that amount. Forecasted growth in electrical power demands show that by the year 2000, the waste heat load to Lake Michigan will be 10 times the present amount.

Until we know the exact effects of thermal discharges on the aquatic environment, we must require the use of technically feasible cooling systems.

"All new and existing electrical power industries must be required to construct cooling facilities by early 1973. The cooling facilities should be constructed in a manner enabling the system to be closed or open. A 3° increase in temperature at the point of discharge would be permitted at certain times of the year if the industry submitted proof that the discharge would not affect the quality of the water or the life it supports. The use of a combined opened-and-closed system would permit the recycling or holding of heated effluent at certain times of the year.

"The exact affects of thermal discharges on the aquatic environment are not known. Therefore, a two-phase environmental study program should be conducted under the guidance of the Federal Government.

"First, an intensive study at one site should be developed for field work during the winter of 1971-72 with a preliminary report due in October 1972. It is recommended that the Waukegan and Zion generating stations in Illinois be utilized. Already, a private laboratory has proposed an intensive-study program at this site.

With appropriate guidance by the U.S. Environmental Protection Agency and possible Federal support, the study could be expanded to encompass all aspects of thermal effects on the lake.

"Second, current investigation should be undertaken under criteria developed by the conferees at all other existing powerplants on the lake. These studies should be accomplished by October 1972 and should include, but are not limited to, flow and temperature of the cooling water and the effects of passing plankton, fish eggs, and fish larvae through the condensers."

That completes the Governor's statement.

Governor Lucey's statement is concise and to the point. He clearly reflects his concernfor the quality of Lake Michigan. I believe it also expresses the general public impatience and concern that this Conference come to grips with the thermal issue and proceed with recommendations.

The Governor has directed the Wisconsin conferees to make it clear that his statement is a declaration of Wisconsin objectives in dealing with thermal discharges to the lake. The Governor also recognizes the existence of perhaps technical and time limitations and perhaps the limitations of the legal authority of the Conference and perhaps the limitations of present State and Federal legislation.

We, as conferees, are prepared here today to concur in recommendations of this Conference that are progressive and supportive of the Wisconsin programs for protecting the quality of the lake. They are also committed to pursuing all other State and Federal mechanisms currently available in supporting new Federal and State legislation to secure the Wisconsin objectives for the control of industrial discharges.

This completes our statement, and you may want to defer any discussion until you hear from the other public people.

MR. STEIN: Thank you very much. (Applause)

I suggest we defer questions until later.

I think it should be recognized, and I think it is fair to state that, on its face, at any rate, it looks like a stricter position than the Federal position.

Michigan.

MR. PURDY: I am wondering if Ruth Collins from the U.A.W. is here.

Again, you don't look like Ruth Collins.

MRS. LEE BOTTS: I wear many hats.

Mrs. R. Collins

Mrs. Collins is the International Representative of the Department of Conservation of United Auto Workers, headquartered in Detroit. She says in her statement that she is appearing here today speaking for the U.A.W. Vice President Olga Madar, Robert Johnston, Director of Region 4, Illinois and Iowa, and Harvey Kitzman, Director of Region 10, Wisconsin and Minnesota.

Again, I will not take time to read the entire statement which Mrs. Collins asked me to submit on behalf of United Auto Workers. It does call for protection of Lake Michigan from waste heat from powerplants.

Thank you very much.

MR. STEIN: Thank you.

Do you want to put that statement into the record? Without objection that statement will appear as if read.

(The statement above referred to follows in its entirety.)

Mr. Chairman:

My name is Ruth Collins, I appear here today speaking for UAW Vice President Olga Madar, Robert Johnston, Director of Region4, Illinois and Iowa and Harvey Kitzman, Director of Region 10, Wisconsin and Minnesota.

We wish to express the concern of our Union's million and one-half members and their families about the serious threat to our lakes and streams by our failure to take effective steps to stop the practices that cause the pollution, and to remedy the damage already done. We are not experts in the field of ecology.

Our Union has actively engaged in efforts to preserve our environment and to prevent the destruction of our natural resources of which water is one of the most important. We are becoming increasingly concerned over the realization that the long-sought for peaceful use of atomic energy poses a more serious threat to humanity and the environment than did the atomic bomb because of the accelerated growth of giant nuclear plants in America.

In response to the nation's growing need for electrical power, atomic energy has emerged as the new technology for its provision. While the development of peaceful uses for nuclear energy through a partnership of industry and government may be applauded, many scientists are beginning to ask whether our pressure for speed in commercial development of nuclear power generating reactors does not present more problems than the benefits they are supposed to produce. The matter of cooling water from these generators is one of these problems.

There are presently 55 plants in operation or under construction in the United States, with an increase of 450 estimated during the next decade.

It has been estimated that in the next five years, 19 nuclear plants with a power capacity of 12,470,000 kilowatts will be located on the shores of the Great Lakes, and will discharge 20,000 cubic feet of hot water per second into Lake Michigan. Utility Companies estimate that by 1990, installation will be 39,300,000 kilowatts. The waste heat would raise about '8 billion gallons of water every day by 15 degrees fahrenheit.

In other words, the operation of the nuclear plants which are planned will be equivalent to a heated, man-made Mississippi River flowing into the Great Lakes.

Since temperature is the most important single factor governing the occurance and behavior of life, this torrent of hot water could disturb the delicate relationship between temperature and marine life, thus bringing about destruction to aquatic life. It seems incredible that we have moved so rapidly to such a massive application of this new technology (which will subject our environment and Great Lakes to this greater heat stress as well as to radioactive wastes than they have ever had) - before its full effects are known.

Our members are among the millions of citizens who are becoming increasingly incensed at the absurd contention that they have to choose between power and pollution. People are beginning to speak out against a power industry which uses a threat of "black-outs" to frighten the public and conservationists into quiet, so that the utilities can pollute at will.

In Illinois, the UAW has filed suit against the Commonwealth Edison Company in Zion, charging that their proposed nuclear reactor plant would cause deterioration of Lake Michigan through the excessive discharge of heated water, and asking an injunction to prevent the utility from using Lake

Michigan water unless it is returned to the Lake at its natural temperature. In Michigan, our members have intervened in the Consumer Power licensing request for a nuclear plant in Midland. We supported the action of the intervenors at Palisades.

This kind of preventure action is needed, and will provide the industry with the initiative to find ways of dissapating heat or using it for beneficial purposes. It is more economical to incorporate the new technology in new construction than to correct disastrous mistakes after their occurance.

Once a plant is built and the economy of the community is tied to its operation, it is often difficult to enforce needed standards and regulations.

Strong regulations are necessary because we cannot continue to permit unnecessary pollution from electrical generating plants whi~~ch~~LE the rest of the world is trying to clean up an environmental mess that threatens survival of the planet. Power plants are unique----in that they are public utilities--they have been granted a monopoly to do business in these states and so, have a higher degree of responsiblity than other business.

Mr. Chairman as I said at the beginning of my statement, we are not experts in the field of ecology. Maybe this is why the technical committee conclusions and recommendations appear to be confusing or contradictory.

In recommendation #4, the committee recommend that all thermal electric power generating facilities using or planning to use Lake Michigan water for dissipation of artificial waste heat be required to have closed cycles cooling systems. then they say Unless it has been demonstrated that ecological damage does not or will not occur from once - through cycles.

The committee further recommends that in depth studies be made to determine the effects on the ecology. I fail to understand how the committee can reach conclusions and make recommendations and at the same time agree that the studies to date are inadequate.

The main order of business today should be to set standards to protect waters of Lake Michigan from damage due to heated waste waters.

We agree with the policy recommended by the Federal Water Quality Council in May of 1970 which would require Lake Michigan water users to return the publics water at no more than 1 degree hotter than when withdrawn.

Mr. Chairman Thanks for hearing our view on this matter.

MR. STEIN: Indiana.

MR. MILLER: Ted Falls, President of the Porter County Chapter of the Izaac Walton League of America, from Chesterton, Indiana.

STATEMENT OF TED FALLS, PRESIDENT, PORTER
COUNTY CHAPTER, IZAAC WALTON LEAGUE OF
AMERICA, WHEELER, INDIANA

MR. FALLS: My name is Ted Falls. I am President of the Porter County Chapter of the Izaac Walton League.

A great deal of what we have presented here has already been said and said very much better, so I am going to abbreviate my speech to save time.

We would like to make the point that there are questions that have come before this Conference both at the last session and at this which have not been answered and we would like to make the point that these answers are readily available. Much of the time, the tests that were necessary and the studies that were necessary were at hand for the investigators, but they were ignored.

Why do salmon and trout seek warm water? Is it because they seek the greater activity possible to cold-blooded animals in the higher temperature, in spite of scarcity of food? Is it because their prey is attracted to the warmer water? Fishermen report extraordinary vigor in taking baits around the plumes. Is this because they are hungry, or because of heavy feeding?

A study would be a relatively simple investigation of stomach content down the food chain present. At the bottom of the scale are the plankton, which certainly are not in increased abundance because of the heat: rather, the quantity of live survivors is sharply decreased, as is generally acknowledged.

What is the actual effect of passage through the condenser system on small fish and the survival of plankton? How many, and what, are entrained at the intake? There are a number of existing intakes inshore, and at various distances offshore, for industries and municipal water systems, A study at the cribs and filter beds might reveal important information.

What is the effect of pressure stresses in passing through the system? 1) There is a relatively slow pressure drop along the intake conduit. The time rate can be calculated accurately. There is a limit to the time rate to which a fish can accomodate. 2) There is a sharp pressure drop between the pump intake and the rotor blades. Pumps are designed close to the limit imposed by cavitation.

T. Falls

The pressure here can drop in a very short time interval to the order of 0.5 p.s.i.a. This is a ratio of 25/1 to 30/1 to the habitat pressure. This means that the air sac of a fish could be expanded to 25 to 30 times the original volume. Rupture will be the consequence. Immediately past the rotor, the pressure increases to approximately 27 p.s.i.a., reducing the buoyancy of the air sac of any survivors to half or less of the natural habitat. This will leave them helpless. Simple field measurements will be necessary to determine the scale of pressures in the system, and the time sequence. This then can be duplicated rather simply in the laboratory for direct observation.

What is the effect of temperature shock, especially on plankton? The operating temperature of powerplant condensers is 40 to 60 degrees above intake temperatures. Contrary to the impression given by published data on condenser discharge water, 50 to 60 percent of all water circulated in the system, with entrained life, will be subjected to this highest temperature, a rise in a very short interval. It is elementary to collect samples at the discharge end of a condenser system for laboratory study of survival, with intake samples for control. Current reports of kill are so cursory that the subject seems to have been avoided by the investigators.

T. Falls

What is the effect of jet plumes discharged close to the bottom, as at Zion? An accurate forecast can be made from present knowledge in biology and other fields. Because of the nature of fluid flow, turbulence will sweep the bottom over an area greater than the plume. The cumulative temperature effect will accelerate all bottom life that can resist the scouring. Dr. Colby has demonstrated the acceleration of the season for fish hatches. In this connection, it is interesting that Dr. Ayres reported gravel beds in his bottom survey of the Benton Harbor area, but did not map them. Biologists, as well as fishermen, should know that gravel is the spawning bed for important fish species in the lake food chain. None of Dr. Ayres' study recognizes the presence of either fish spawn or fry, even though one sampling series was at the season.

What will be the consequence of increase of plant life in inshore water? This cannot be a laboratory study; but it is a challenge to assemble our present knowledge and make a decision. In spite of Dr. Ayres' failure to find benthos in the shore area of vigorous wave action, all can observe attached algae species growing in the surf. We also know that elevation of temperature contributes to this growth. The consequence is an increase in the contribution of organic material on the bottom, with eventual pondweed types offshore.

We wish to submit the following position: Powerplants now in operation are an adequate field for study of the consequences of the addition of heat to the ecology of the lake. Studies up-to-date have ignored essential phases. Adequate studies will show genuine and intolerable damage to the lake. There is no limit below which proliferation of powerplants along the lakeshore can be tolerated.

Powerplants in the course of construction should be required to use an alternative method of cooking -- or cooling. (Laughter) Plants now in the planning stage must be located inland, where there is room for cooling ponds. Our study indicates that evaporative cooling towers will prove to be extremely objectionable and will have to be abandoned within a few years of first operation.

All additions to existing powerplants must be forbidden the use of the lake for once-through cooling.

All studies of the impact of powerplants (and other industries) on the ecology of the lake must be under the direction of an impartial committee. It has become obvious that studies controlled by an industry are weighted by their interest.

All monitoring of effluents must be held under the strict surveillance of impartial government agencies.

Thank you.

MR. STEIN: Thank you, Mr. Falls. Your whole statement will appear in the record.

(The statement above referred to follows in its entirety.)

DEDICATED TO THE PRESERVATION OF OUTDOOR AMERICA

The Izaak Walton League of America

PORTER COUNTY CHAPTER, CHESTERTON INDIANA 46304

To: Four-State Enforcement Conference on Pollution of Lake Michigan,
Chicago, Illinois,
March 23, 1971.

Submitted by: Ted Falls, President,
Wheeler, Indiana 46393.

Gentlemen:

Lake Michigan is a vast resource. To citizens as people it has many values that I do not have to discuss here, to only a small part of which a dollar value can be given. To citizens responsible for the management of our power supply, and for the management of industry, it is a vast source of cooling water at a remarkably low temperature, with a vast capacity for industrial and human wastes. Recently, the alarm raised by environmentalists has been resolved into the question: How much abuse can Lake Michigan stand? A parallel question is asked by the power companies: How dense can the power plant population become before interference reduces the advantage of low temperatures?

How much abuse can Lake Michigan stand? This question cannot be answered beyond question until damage is done. Then it is too late. Lake Michigan cannot repair itself as Lake Erie might. It is a vast pocket, with minuscule flow-through. Dr. John C. Ayres notes industrial damage now in progress. I quote from his "Benton Harbor Power Plant Limnological Studies" for American Electric Power Service Corp. and Indiana and Michigan Electric Co., dated November 1967, Part I, page 4: "There is a lack of detailed knowledge in many regions, but we know of disrupted normalcy of the benthos at Milwaukee, in the inshore region from Chicago to Michigan City, and at the mouth of the St. Joseph River."

How dense can the power plant population become before interference reduces the advantage of low temperature? The answer to this question bodes ill for those who would preserve the lake for its dollar-free values. The power companies have supported scientific studies of Lake Michigan at great expense. Their interest is to justify their use of this "vast resource and dump". We are told of their concern for preserving unsoiled the ecology of Lake Michigan, and that their studies support growth to 29 large power plants (1967). How many more since? Their attention to the ecology of the lake has been cursory at best. There is a body of scientists who disagree with their conclusions. A few have appeared here.

This points to the value of the Bureau of Fisheries, no longer limited to commercial fishing, or to the interests of sports fishermen. They can now operate in broad fields concerning the environment. To date, their work has not been directed in depth to the problem, although they have put some very pertinent information before this Conference. They have not reached a point at which they can offer summary conclusions. I do not need to describe how they can be blocked by interests that their findings might embarrass. Citizen environmentalists do not have the funds to sponsor the projects of scientists in other institutions. Generally, independent scientists, such as have appeared here, find great difficulty to find sponsors for their studies purely in the matter of environment.

It might be of value to point out here that no broad, effective program of study will result without leadership; and it is in the hands of this Conference to provide that leadership. You should create a committee -- or propose it to the Department of the Interior or the Environmental Protection Agency -- which would see that all essential phases of the ecology of Lake Michigan are covered. This committee should include academic scholars and practical field men, as far as possible environmentalists, "hard-headed" as against "hard-core". It also should provide a means to speak to the layman -- too much of the knowledge that is the basis for judgement is in esoteric language.

There are a number of questions that have come before this Conference unanswered, and are asked among environmentalists. Some of them can be determined simply and directly. We ask: Why have they been ignored? We would like to discuss several of these questions.

Why do salmon and trout seek warm water?

Is it because they seek the greater activity possible to cold-blooded animals in the higher temperature, in spite of scarcity of food? Is it because their prey is attracted to the warmer water? Fishermen report extraordinary vigor in taking baits around the plumes. Is this because they are hungry, or because of heavy feeding?

A study would be a relatively simple investigation of stomach contents down the food chain present. At the bottom of the scale are the plankton, which certainly are not in increased abundance because of the heat: rather, the quantity of live survivors is sharply decreased, as is generally acknowledged.

What is the actual effect of passage through the condenser system on small fish and the survival of plankton?

How many, and what, are entrained at the intake? There are a number of existing intakes inshore, and at various distances offshore, for industries and municipal water systems. A study at the cribs and filter beds might reveal important information.

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The operating temperature of power plant condensers is 40 to 60 degrees above intake temperatures. Contrary to the impression given by published data on condenser discharge water, 50 to 60 % of all water circulated in the system, with entrained life, will be subjected to this highest temperature, a rise in a very short interval. It is elementary to collect samples at the discharge end of a condenser system for laboratory study of survival, with intake samples for control. Current reports of kill are so cursory that the subject seems to have been avoided by the investigators.

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An accurate forecast can be made from present knowledge in biology and other fields. Because of the nature of fluid flow, turbulence will sweep the bottom over an area greater than the plume. The cumulative temperature effect will accelerate all bottom life that can resist the scouring. Dr. Colby has demonstrated the acceleration of the season for fish hatches. In this connection, it is interesting that Dr. Ayres reported gravel beds in his bottom survey of the Benton Harbor area, but did not map them. Biologists, as well as fishermen, should know that gravel is the spawning bed for important fish species in the lake food chain. None of Dr. Ayres's study recognizes the presence of either fish spawn or fry, even though one sampling series was at the season.

What will be the consequence of increase of plant life in inshore water?
This cannot be a laboratory study; but it is a challenge to assemble our present knowledge and make a decision. In spite of Dr. Ayres's failure to find benthos in the shore area of vigorous wave action, all can observe attached algae species growing in the surf. We also know that elevation of temperature contributes to this growth. The consequence is an increase in the contribution of organic material on the bottom, with eventual pond-weed types offshore.

The question: How much abuse can Lake Michigan stand? has precipitated a discussion in which the major issue has been lost in details. It has been estimated that a soluble pollutant in the lake, once terminated will be diluted 50% in 100 years, such is the relation of volume to outflow. This applies to the lake as a whole. The southern half will take longer. Actually, the problem narrows to the inshore waters, where there is the greatest concentration of life. Nutrients, as they are added to what is already in the lake, enter the life system and lock in for a much greater time than the hypothetical pollutant of the estimate. Heat, added to the inshore waters, enhances the activity of the life system, obviously to become the wrong life system. Unfortunately, even when it becomes apparent that industry has over-balanced nature, it is extremely difficult or impossible to stop industry. It is even more difficult to correct the condition in nature. We think it is reasonable to apply our intelligence to the control of these problems before we are overwhelmed by the consequences of neglect.

We wish to submit the following position:

> Power plants now in operation are an adequate field for study of the consequences of the addition of heat to the ecology of the lake. Studies up to date have ignored essential phases. Adequate studies will show genuine and intolerable damage to the lake. There is no limit below which proliferation of power plants along the lakeshore can be tolerated.

Power plants in the course of construction should be required to use an alternative method of cooling. Plants now in the planning stage must be located inland, where there is room for cooling ponds. Our study indicates that evaporative cooling towers will prove to be extremely objectionable and will have to be abandoned within a few years of first operation.

All additions to existing power plants must be forbidden the use of the lake for once-through cooling.

All studies of the impact of power plants (and other industries) on the ecology of the lake must be under the direction of an impartial committee. It has become obvious that studies controlled by an industry are weighted by their interest.

All monitoring of effluents must be held under the strict surveillance of impartial government agencies.

MR. STEIN: Are there any questions or comments?
Now, we will go to Illinois.

MR. BLASER: The next speaker is Mr. Arthur Pancoe, Scientific Director of the Society against Violence to the Environment and Campaign against Pollution.

STATEMENT OF ARTHUR PANCOE, SCIENTIFIC DIRECTOR OF SOCIETY AGAINST VIOLENCE TO THE ENVIRONMENT AND CAMPAIGN AGAINST POLLUTION, GLENCOE, ILLINOIS

MR. PANCOE: My name is Arthur Pancoe. I am Scientific Director of the Society against Violence to the Environment and Campaign against Pollution.

I have appeared before this Conference on two previous occasions to tell you why I believe it is inadvisable to allow thermal diffusion into Lake Michigan from electric generating plants.

At this time, I will bring before the Conference five major dangers amongst others that have not at any other time in previous testimony been accounted for satisfactorily.

The first peril I wish to emphasize is the inability of plankton to withstand the rapid temperature rise across the condenser.

A. Pancoe

In Dr. Donald W. Pritchard's paper of 1970 before this Conference, supporting the use of the lake for cooling water used in generation of power, he disucsses in detail the various aspects of the problem with the ultimate conclusion that presently proposed plants will have no measurable effect on the overall lake temperature. In this I concur. But the subject Dr. Pritchard deals with in most detail is how to discharge the cooling water in a way which will allow the most rapid dilution of the thermal plume. Why is this the major concern of his presentation? I suggest the answer may be found on the bottom of page 20 of this report.

"For example, in the case of the Zion Power Station, the time of transit of the condenser cooling water from the condensers to the point of discharge will be approximately 2 minutes. In order to minimize any possible biological effects of using the surface waters of Lake Michigan for cooling, the condenser cooling water flow system should be designed to minimize the time of transit of the heated effluent from the condensers to the point of discharge." Note: Dr. Pritchard even though a proponent of using the lake for once-through cooling purpose, and a Commonwealth Edison witness at the last Conference, uses the words "... minimize any possible biological effects."

This means there is a problem here, and at the very basic level of the food chain. Since only 10 percent of the energy radiated to the lake is available to man and is manifest at this microscopic level of the food chain, as we move up the food chain, each level is at most 10 percent efficient. We can readily see that we are taking a risk at the most basic level of life, and the dangers, if we are wrong, are not insignificant.

Yesterday I received a call from Dr. Thomas Roos, the Biologist of Dartmouth College -- and I might point out that this is his exact specialty -- who expressed deep concern over this use of lake water. He said that the sudden rise of 20° F. across the condenser, in his opinion, will kill most, if not all, the Phyto and zooplankton. He stated that the two minutes of anticipated time that plankton is exposed to the extremely warm water may not seem much in the life of an individual, but must be correlated to the one and a half or two day life span of the form of life in question.

He reiterated the danger to the entire lake's life if harm comes to this primary level of the lake's food chain.

I might point out that Professor Roos formerly lived on the North Shore and has an overall familiarity with the lake.

It should be noted here that it is estimated that all inshore water will flow through, on the average, one of those plants three times per year. To the extent that the Palisades and Bailly Station Plants are intending to use cooling towers, the magnitude of this problem may be reduced. It is recognized that the inshore water is biologically the most productive portion of the lake, and the biota being drawn through these plants is the base upon which all fishes, and to some extent fowl, depend upon for life.

According to Dr. P. F. Gustafson of Argonne (see 215a) National Laboratory in a paper also presented previously before this Conference -- and it is a part of Commonwealth's position -- little, if any, environmental changes can be detected about the discharge areas from existing fossil plants operating about the lake. But he goes on to say "... but secondary, more subtle, effects at some distance from the point of input may take place." But can it be denied that there is an ideal optimum temperature for the growth of blue-green algae, and such an ideal environment will be created artificially and rather permanently in a boundary area about the mixing zone?

This algae has some species which multiply most profusely at 95° F. and other species that prefer

U of C-AUA-USAEC
ARGONNE NATIONAL LABORATORY

March 29, 1971

Mr. Murray Stein
Assistant Commissioner for Enforcement and
Standards Compliance
Environmental Protection Agency
Water Quality Office
Washington, D. C. 20242

Dear Mr. Stein:

If possible I should like to have the following statement entered into the record of the Lake Michigan Enforcement Conference held in Chicago on March 23-25, 1971.

On March 24, Mr. Arthur Pancer, Scientific Advisor to CAP and SAVE in his written statement referred to parts of my presentation to the Four State Workshop in September-October 1970 as "having been made in support of Commonwealth Edison."

I should like to clarify the point that the Great Lakes Research Program at Argonne National Laboratory is a scientific one, with the objectives of determining the physical and biological fate of thermal and radionuclide discharges into large lakes. It is not unlikely that our conclusions will at times be supportive to the position of one or more parties to the Lake Michigan question. My presentation was meant solely to convey our research findings and scientific judgments, and not to support the utility industry.

Although not a participant in the recent Enforcement Conference, I watched the proceedings with interest. I must congratulate you on your patience and skill in moving things along, as well as in keeping the overall peace.

With best regards,

Sincerely yours,

Phil Gustafson

Philip F. Gustafson
Associate Director
Radiological Physics Division

PFG:frc

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temperature in the range of 86° F. This algae is already found in abundance at the Southern end of Lake Michigan. It is very adaptable and will even grow well within the plants' cooling systems where the water is at its highest temperature.

Here is an interesting point: Mr. George E. McVehil on behalf of Commonwealth Edison Company testified before the Illinois Pollution Control Board last November that if cooling towers were installed at Zion fog conditions would exist in the Zion area, as the result, various numbers of days per year, depending upon the type of towers installed. I am somewhat surprised that Dave Currie did not raise this with all of the scientific perception that he has shown here on the platform today.

I concurred in this prediction in a letter to the Illinois Control Board, but I believe he failed to mention that similar fogging conditions may very well occur over the lake in the area of discharge. That is, a large amount of the heat loss from the area of thermal plume will be due to increased surface evaporation, as a result of increased heat. I suggest that anyone with any background in physics or chemistry or meteorology would obviously see this point. You can't depend upon the evaporation to dispose of the heat when you want to in one discussion to get rid of it so it isn't going to harm the lake, and at the next moment when you are talking about fogging conditions completely overlook the same phenomena of physics. You will note in Dr. Pritchard's testimony mentioned earlier he specifies that approximately 15 percent of the heat lost from the lake is due to evaporation. While he was discussing this figure in a different context -- I don't know, assuming that no one would bring it up in the context I am now bringing it up -- its application to my point is obvious. Also, Dr. Gustafson mentions this problem in a very peripheral and running through way in his report. I suggest should the fogging over the lake be less intense than above towers -- now, remember what I am saying, it will be less intense -- but will cover more area, the total effect on the environment of say, Zion -- which has been used as scare tactics -- might very much be the case as if cooling towers were there. That is, if there is an intense fog about the towers no one really cares about it but if the wind is blowing in the direction of Zion and it diffuses out over the area, it will lose its density and cause a fogging problem. This exact condition will occur in the lake in front of the plant and will move in over Zion with the same inshore wind so what is right for one site is right for the other. Let's get rid of the scare tactics about this fogging business.

In lakes and ponds (lentic environments) the biota are synchronized in their life cycles by changes in water temperatures. If man in a major way distorts this very finally turned gradual and sequential mechanism of the inshore waters in the spring of the year, the consequences may be far more dramatic than we can even envision. For a detailed description of this possible danger, I refer you to the previous paper I presented here in September 1970, with special reference to paper attached to that report, by J. J. Resia of the Department of Biological Sciences, Northwestern University.

I also received a call in unison from two of the world's most eminent limnologists today, Dr. John Magnuson of the University of Wisconsin had this to say and he wants this as an overall position read into the record. He has perhaps done as much work on the life of the lake with regard to fish and thermal plumes as any man now alive. His overall position is that we should not -- and I repeat, and he will back this up -- we should not take a chance. Most of the research that has been done has been done with warm water lakes.

He wished me to bring before this Conference a point that I think is unique. He is as much concerned, if not moreso, with the fact that fish will by their own nature be repelled from the thermal plume and the areas of the thermal plume at certain times of the year as he is with the idea that certain fish will be attracted.

Now, remember what he said. He is as much concerned with the fact that these fish will by nature leave the area of the thermal plume as he is by the idea that certain of the species will be attracted to the thermal plume. And he wanted this read into the record today.

I will conclude with my final point. I wish to point out what I believe to be an erroneous idea that now or in the future will it be possible to isolate, for example, heat alone, as a specific contributor to the death of Lake Michigan.

Synergism: The detrimental effects of heat, chemical fertilizers, chemical pollutants, sewage, bacteria, and solid wastes being discharged into the lake may very well in combination be far more disastrous to the lake than the study of any one of the perils alone might suggest. I also suggest that fish congregating about the discharge area might be subject to very disproportionate degrees of radioactive discharge either accidental or on purpose.

If damage does occur from the heat, it will be subtle at first and may not make itself manifest for years or even decades into the future. Damage will be accumulative, as Lake Michigan does not have a rapid change-over of water. I also suggest that at no time will it be provable that heat alone is responsible for the damage.

In a statement to me yesterday, Professor Arthur D. Hasler, of the University of Wisconsin, one of the world's outstanding limnologists, expressed deep concern over the direction we are going with regard to disposing large amounts of heat into the lake. He stated to me that he would much prefer to see this heat disposed of into the atmosphere at this time.

I would like to conclude by presenting to the Conference over 5,000 signatures of people from Northern Illinois requesting that this Conference adapt a standard allowing no thermal discharge into Lake Michigan from electric operating plants, either under construction now, or planned for the future, since alternative means of distribution of the heat are available.

(The above-mentioned signatures are on file Hq.EPA.)

Thank you. (Applause)

MR. STEIN: Thank you, Mr. Pancoe.

Any comments or questions?

If not, may we hear from Wisconsin.

MR. MACKIE: Is Mrs. Robert Erickson here?

MRS. ERICKSON: I wanted to speak tomorrow in relation to another thing than thermal discharges, please.

MR. MACKIE: Mrs. Grace Knapp.

STATEMENT OF MRS. GRACE KNAPP,
MILWAUKEE AUDOBON SOCIETY,
MILWAUKEE, WISCONSIN

MRS. KNAPP: I wish to make this statement on behalf of the Milwaukee Audobon Society.

We wish to make clear our stand on the discharging of heated water into the lakes and rivers by powerplants.

It is a well known fact the demand for more and more electrical power has been increasing. To supply that demand, greater power sources are needed. This has led to the building of more powerplants, including the nuclear power companies.

We are not opposed to powerplants as such -- nuclear or otherwise. We are opposed to the discharge of superheated water into our lakes and rivers, because we are not satisfied that sufficient evidence of the ecological impact of such action has been obtained. We are convinced that it is foolhardy to gamble with the long-range welfare of man and his environment for the sake of an immediate and perhaps only too short-lived gain.

We therefore firmly stand beside those who urge further honest, diligent study now, so that when we go on to build, our progress may be truly beneficial.

And, at this time, I wish to state that the Milwaukee Audubon Society will have the privilege of hosting the National Audubon Convention, and as one of our main speakers we will have the pleasure of having William D. Ruckelshaus, Administrator for the Environmental Protection Agency. This convention will be held on May 20-24 and we invite you all.

Thank you.

MR. STEIN: Thank you.

May we go to Michigan?

MR. PURDY: Mr. Chairman, I believe this completes the public or private individuals that — oops, a hand up here? I don't have the name.

I know I have some statements to be made on the topic for tomorrow but —

FROM THE FLOOR: Still for Michigan?

MR. PURDY: This is for Michigan.

That completes the private individuals from Michigan, Mr. Stein.

MR. STEIN: Okay.

Again, we want to give everyone an opportunity, but as I indicated, we just cannot do the impossible. As many of you who have been at the conferences before know, the product of the conference is the record. I think the records have been useful, since some of the statements that we have heard have analyzed past records. There is only so much a court reporter physically can do in one day, and we are not going to be able to continue this indefinitely. So I think we are going to have to make a determination. I have just checked with Mrs. Hall, and I am not sure that we are going to be able to continue much longer today.

Let's call on Illinois.

MR. MILLER: Indiana.

MR. STEIN: Indiana.

MR. MILLER: All right. Mr. Ted McDonald, Livingston Hills Association.

FROM THE FLOOR: Mr. McDonald had to leave.

MR. MILLER: Then this would conclude all of the names that I have for public presentation from Indiana.

MR. STEIN: How many more do you have?

MR. BLASER: About 21.

MR. STEIN: How many more does Wisconsin have?

MR. FRANGOS: Total number?

MR. STEIN: Yes. No, not industry just citizens.

MR. FRANGOS: Just one more, I believe.

MR. STEIN: All right. Let's go in order.

MR. FRANGOS: I am sorry. We are done.

MR. STEIN: What?

MR. FRANGOS: We are finished.

MR. STEIN: You don't have any more?

MR. FRANGOS: Other than industry.

MR. STEIN: No, I suggest we leave industry.

I would like to make an equitable provision with Illinois to see where we could get a reasonable cutoff tonight. Are there several people who you feel we have to call and we have to accommodate?

MR. BLASER: All right. Let me suggest, I would ask time estimates on those folks --

MR. STEIN: I really don't think we can go more than another half hour with the reporter.

MR. BLASER: Well, the next person has asked for 3 minutes; the next 10; the next, 6; the next I do not have the time.

Incidentally all of ours are in time of receipt. These that I have were received by letter before the meeting.

MR. STEIN: May I suggest this. We will go another half hour and we will both make a judgment on the half hour when it is up.

MR. BLASER: I might ask that those who speak -- if they could condense their reamrks and move along rapidly it will enable others to have the chance to speak.

MR. STEIN: Why don't you just manage your own time.

MR. BLASER: Okay.

Mrs. Lee Botts, you have spoken for others. You had asked to speak for yourself though quite a while ago. This is the 3 minutes. Right, Mrs. Botts?

STATEMENT OF MRS. LEE BOTTS, EXECUTIVE SECRETARY, LAKE MICHIGAN FEDERATION,
CHICAGO, ILLINOIS

MRS. BOTTS: I am not speaking for myself, I am speaking for the Lake Michigan Federation.

The purpose of the Federation is to provide information to citizens of Wisconsin, Indiana, Illinois, and Michigan for public policy decisions on the lake.

In recent months we have devoted much effort to increasing citizen participation in the enforcement conference. Unfortunately, to date, the chief result has been to undermine citizen confidence in the capacity of government to deal with the problem of preserving Lake Michigan.

The issue before this Conference today is a thermal standard for Lake Michigan, specifically whether the waste heat from nuclear powerplants operating or being built on the lake shores should be disposed of in lake waters. Briefly, I wish to review for you the history of the enforcement conference so that you will understand why this session probably offers the last opportunity for resolving the thermal question in this procedure; so that you will understand why a despairing public will turn to other means to achieve protection of the lake if the enforcement conference continues to fail.

The Lake Michigan Enforcement Conference was initiated in 1965. In his opening remarks Chairman Murray Stein extrolled the conference technique, saying, "We consider as successes those problems which are solved at the conference table, rather than in court." This is how the thermal question has been dealt with to date around the enforcement conference table: In February of 1969 when the five large nuclear plants with their eight new reactors were in the early stages of construction, the enforcement conference heard a technical committee report from F. W. Kittrell, consultant to the Federal Water Pollution Control Administration. Today, two years later, with one Point Beach reactor in operation, another ready, and all the other nuclear plants finished or almost finished, what progress has been made in the enforcement conference toward a thermal standard?

Today, we have another technical committee report which says essentially what the Kittrell report said: that there is a risk to the lake from the waste heat but we cannot really know until more studies are done. What was Mr. Stein's response to the Kittrell report? Why, he said that if the FWPCA coordinated a comprehensive study as recommended, there was no assurance the result would not call for another study. "This can," he said, "Go on forever." Ladies and gentlemen, today we meet after a full year of conferring on thermal effects, beginning with a plea by myself and others at Milwaukee last March 30 that the thermal question be resolved. We have had open executive sessions, and closed executive sessions and a 5-day workshop and feasibility studies to back up a 1° position that was repudiated and a compromise offered in terms of B.t.u.'s that was abandoned almost as soon as it was offered.

And we still know what we knew in 1969: that to put the waste heat from nuclear powerplants into Lake Michigan may threaten the life of local areas, with unknown consequences for the whole lake. What we know best of all is that if we wait for studies by government, and if we wait for decisions based on studies, Mr. Stein is probably right. This conference can go on forever, and in any way that really matters, it can get nowhere.

Meanwhile, of course, the utilities have continued to build the plants as they were originally designed. Through no fault of their own -- for how could they do otherwise when not directed by the agencies charged with regulating disposal of waste heat -- while the conferees have conferred in the enforcement conference, the power companies may have spent millions of dollars for intake and discharge systems to the lake they will not be able to use, expenditures which will ultimately be paid for by you and me. I say may have, because there is one exception to what has happened to the nuclear plants, and that is at the Palisades plant at South Haven, Michigan.

There the public intervened in the operating procedure and was ready to go to court if necessary to achieve what this enforcement conference has not achieved: protection of Lake Michigan from the waste heat. Mr.

Mrs. L. Botts

Chairman and conferees, if this enforcement conference does not set a thermal standard that protects the lake from waste heat from nuclear plants, then the public will be forced to resort to the one means that has so far been effective in achieving protection, interventions and court action.

The public will do this knowing full well the great cost involved, both in direct costs of the proceedings and the costs of delaying operation of completed plants. The public will intervene whenever it has to, because the public recognizes what has been ignored here, while you conferred and waited and conferred again. Lake Michigan may not go on forever.

What has happened while you here failed to agree on a thermal standard is that 1) the utilities have not been able to prove the heat will not damage the lake, as the most recent technical committee report states, and that 2) the consequences of past damage to the lake are now apparent throughout, even in the northern basin.

We are now at a point where we cannot afford to delay any decision that is critical to the lake, for, according to the scientists who have been monitoring the scientific indicators of its health, diatoms associated with moderate to high levels of pollution now cause nuisances in inshore areas and are becoming increasingly abundant offshore throughout the lake. Other diatoms indicating extreme degradation of water quality in the Great Lakes entered Lake Michigan between 1947 and 1964 and are becoming more widespread. Although their numbers are small, their presence indicates that the pollution of Lake Michigan is reaching critical levels. I direct you to the work of Dr. Eugene Stoermer so far ignored in this Enforcement Conference. For your information, I submit this scientific report from the Great Lakes Research Division of the University of Michigan with the full details of these facts.

Mr. Chairman and conferees, Lake Michigan needs your protection from every possible risk and the public demands that you provide it. Waste heat from the nuclear powerplants poses a risk because the full consequences are not known. If you cannot resolve this question around your conference table and move on to deal with others equally or more serious, then the public must turn elsewhere.

You must act now, or I fear that the public will turn to the courts and to interventions in licensing procedures, at great cost to everyone.

Thank you.

MR. STEIN: Thank you. (Applause)

MR. BLASER: Mrs. Botts, the next two speakers you had requested a place for them -- John Landrum and Miss McKee.

If I may, since you are relinquishing -- since the Federation has been represented, I would like to move on to some others. May I?

MRS. BOTTS: Right.

MR. BLASER: The next speaker whom we have received a request from was Peter Martinez representing a Committee against Pollution.

MR. CRAMER: I will speak for him.

MR. BLASER: You will speak for him. That was my question. Fine.

STATEMENT OF ROBERT CRAMER, CAMPAIGN
AGAINST POLLUTION, CHICAGO, ILLINOIS

MR. CRAMER: My name is Robert Cramer. I am here on behalf of the Campaign Against Pollution, CAP, in Chicago.

We would, first of all, like to register an extreme objection to the fact that the public has been forced to remain here through all of the dickering over specific technical points today and not given the same consideration as representatives of the AEC and the Federal Power Commission who came here to represent industry's position. We have a number of people here, as you know, Mr. Stein, who are not paid, as they are to come represent interest's at this morning's session. And we would like to ask that those who don't get on today will be on first thing in the morning.

The major difficulty in preparing a response to Mr. Ruckelshaus' proposal this afternoon is to attempt to say imaginatively one more time what our organization and many others have said for so long -- that no one -- most especially a private corporation -- has the right to use a public lake to dump their wastes, thermal or otherwise, especially where there is abundant evidence that waste would do major damage to that lake.

In the last few weeks, two major power companies have agreed to install closed cooling systems to prevent the damage of their thermal waste to the lake. It is particularly in light of these decisions that we must be quite clear that any proposal short of one which would require closed cooling systems on all of the giant thermal polluters is a sellout to the corporate interests who desire so much to be free from public regulation in these matters.

With the agreement of NIPSCO and the Consumers Power Company to install closed systems, it is the Commonwealth Edison plant which is remaining the most outstanding potential thermal polluter to the lake.

Now, we feel that this plant must not be allowed to open unless it has a closed cooling system, and that any proposal short of that is unacceptable.

Apparently Mr. Ruckelshaus has decided to yield to the considerable pressure of many public groups who have supported the general position that closed cooling systems are necessary.

We must laud this recommendation as a major victory for those who have demanded tough regulations and responsibility to the people. We strongly urge that the standard be adopted by the full Conference and enforced immediately, and that it be amended to prevent plants under construction from opening without closed cooling systems if they violate the regulations.

Now, this talk about letting plants open without cooling facilities simply provides another loophole whereby the power interests can stall just that much longer. Once a utility gets a plant on line, it's got all the clout or power, if you will, because you are not going to close down that plant if it fails to comply. The only lever we have is to prevent it from opening until it does install such a cooling system.

Now, we have heard all sorts of tough policy recommendations before. We started off with Nixon Administration's now famous 1° thermal limit grandstand play of May 7, 1970, and the people of this area have witnessed a show, on the part of the Federal and State regulatory agencies, that has resembled at least a bad rendition of the Keystone Cops ever since, except that the issue is much more serious than that. We have seen delay after delay. We have witnessed Mr. Stein's backroom shenanigans in Grand Rapids, where he attempted to back down from the 1° recommendation behind closed doors. We were subjected to the utmost in reassurance when we expressed fears last November that the appointment of the new Technical Committee was another stalling tactic.

Now, almost 5 months later, we have an unclear report from the Technical Committee, and we finally have another recommendation — a brand new one — from the Federal Government. I might note that after almost 5 months of that Technical Committee deliberation, the report of that committee has now been scrapped for all practical purposes.

As a result of this experience, we demand no more stalls. We demand immediate action by this Conference, and immediate enforcement.

I must add several further gannets. As residents of Illinois, and especially in light of the NIPSCO and Palisades decisions, CAP is shocked that the Illinois Pollution Control Board has not taken a tougher position on this matter. (Applause)

The Illinois Pollution Control Board has had the audacity in the past several weeks to propose that Edison be allowed to operate their Zion plant using 3 billions of gallons of water a day -- of our lake water -- to do their cooling, especially at the same time when they realize the danger of thermal pollution to such an extent that they have proposed a moratorium on construction of all further nuclear plants on the lake. A deal like that with Edison simply cannot be tolerated. Edison will yell and scream that at this late date it would cost them a fortune to backfit the plant with cooling equipment -- and with inflated figures, of course.

Well, if it will, it is their own fault for having continued the construction on the old blueprints for over a year and a half while they have dragged out a decision on the thermal regulations precisely so that they could cliam it would be impossible for them to comply.

In the light of Ruckelshaus and the albeit unclear report by the Technical Committee, we find it completely unacceptable the Illinois Board has taken the position it has, and we might add that we have reason to believe that if the State does not concur and if other States do not concur with a strong Federal proposal, that it may be years before the Federal Government is able to enforce any tough standard on any of these companies. And I would like to get back to that and ask a question regarding it at the close of my remarks.

Now, as I said, we desperately hope that the Federal Government will assume its responsibility in the area of thermal pollution, but we must make clear that regardless of what you do here today or tomorrow, so far as the people are concerned, the plant at Zion will not go into operation without a closed cooling system. Our group and others will tie it up in court, in regulatory agencies. We are going to fight Com. Ed.'s proposed 10.1 percent rate increase. No company that is not facing its environmental responsibility deserves more money, and we intend to see that they don't get it. We will be initiating direct action against this company.

Let me say again: That plant won't open without a closed system. And I might add that CAP and many other groups are becoming increasingly alarmed concerning all of the safeguards of nuclear plants, and we intend to see that EPA and the Illinois Pollution Control Board begin to look further into this whole matter and in particular CAP will be sponsoring a series of rallies concerning nuclear plant safety with Senator Mike Ravel who will be here at our invitation April 22-23. Senator Ravel, as you may know, is a prominent proponent of a 5-year moratorium on the construction of all nuclear plants.

Let me close by saying one further thing. The people of this Nation are tired of corporations that think they have the right to run the government because they have a lot of money. But the time has come for Edison, at least so far as the Zion plant is concerned, to face the public music. We are going to see that it faces that music, and we hope that the Federal and State Governments will begin to take their responsibility seriously.

Thank you very much. (Applause)

I would like to add one question, Mr. Stein and Mr. Mayo: Is it not the case that if the States do not comply to bring their standards into compliance with the proposed Federal regulation even if it is passed by the Conference that it could take many years to enforce on any individual company the proposed regulation? And if that is the case, is this not just a charade?

MR. MAYO: As I mentioned in my comments following the reading of Mr. Ruckelshaus' letter this morning, we want very much to approach theestablishment of standards and the establishment of adequate controls on those plants not yet in operation on a most cooperative basis. But that there should be no question at least so far as the plants under construction are concerned that the EPA intends to employ whatever opportunities are available to it in the way of administrative processes or legislative authorities to work toward the establishment of those controls, whether we can approach it cooperatively with the States, or whether we must act unilaterally in whatever of these administrative procedures are available to us, and if we need, then, to go without the States.

From the standpoint of the standards, the Federal Water Quality Act prescribes the procedures that are necessary for the Federal Government to promulgate standards and to have them adopted in the absence of a collective approach on the part of the States. This is a long procedure.

MR. CRAMER: It is a long procedure. And if Mr. Currie --

MR. MAYO: Currently before the Congress is proposed Federal legislation to amend that procedure considerably and shorten the time. But in the absence of the passage of that legislation, the procedure is, in fact, a fairly long one that requires perhaps a minimum of a year or a year and a half depending on how drawn out the procedures are.

MR. CRAMER: So that if Mr. Currie and the Illinois Board refused to bring their standards into compliance with the Conference standards, they would be in effect preventing the enforcement of these standards for at least one and a half to two years. Is that correct?

MR. STEIN: No, I don't think you are looking at this correctly.

You have several routes to go. We, at least, have as many routes as your private interest group or private citizen's group has to go before a regulatory agency as an intervenor or go to court under the River and Harbor Act, to protect something. As a matter of fact, we have more routes.

Now, the question of how long it will take is another question. The standard route, obviously, is governed by statute. But we are right now and it is a matter of public record -- and I think we are in litigation so I won't want to speculate or discuss the case too much -- right now -- we have a case filed against the

Florida Power & Light Company. This case is before the courts. That may take some time before the courts. But in the same way as any citizen group or anyone takes something before the courts, until the situation is resolved, perhaps the plant won't open until there is a court decision.

I would guess that we can get to the courts in any case at least as fast or faster probably than any citizen group or private citizen can get to it. We may not be able to use the standards but we surely can go to court. If you have looked at our latest cases, you know we are going to court.

By the way, as you may know, the River and Harbor Act of 1899, which is being used now, covers the discharge of all wastes. Although we are concerned largely with industrial wastes, it says all sorts of wastes except liquid wastes from streets and sewers. One of the questions which has come up in that Florida Power & Light case is whether the heated water coming from a powerplant is, in fact, discharged. You get them under the 1899 Act. The court has not ruled on that question. I don't want to surmise whether they will rule on that or if the case will be solved before that. But I think you can expect us to take fairly rapid action.

MR. CRAMER: Will you assure the rest of the people here who have not been allowed to testify today that they will be allowed to testify first thing tomorrow morning?

MR. STEIN: Now, look. I think we are trying to approach this in a gentlemanly way.

MR. CRAMER: Indeed.

MR. STEIN: I have tried. By the way, I urge that the citizen's groups be put on as early as possible.

Our present plans call for the citizens to go on first. We are making every effort to do so. This is the way we are proceeding and will continue to proceed when we convene tomorrow morning.

MR. CRAMER: Thank you very much.

MR. PURDY: I have a question.

This relates to your statement where, on one hand, you seem to applaud the decision of Consumers Power to backfit their Palisades plant and install cooling towers, the closed cycle system. And, as I understand this agreement, they will move into the, say, low operating testing here in a short period of time, and from there, if this proves successful, to go into the operating. Yet the cooling towers will not be installed as they use the natural draft for another 42 months.

But with respect to other facilities, you seem to indicate that you were in complete opposition to their going into operation even though they might agree to put in cooling towers within a specified period of time. This seems to be a little inconsistent. I am wondering --

MR. CRAMER: Well, we applaud the decision of Consumers Power is better than nothing. We certainly would have preferred had they installed cooling facilities prior to the time they open their plant. I would note that, of course, Consumer has agreed to do that in a specified amount of time. I think that a really unfortunate situation would occur in the event that we allow an outfit to open up without at least gaining a commitment from them -- a written commitment -- that they would, in a specified period of time, have installed this equipment. But I think that the optimum situation would be to prevent any of them from opening until they have cooling facilities.

MR. PURDY: I can agree that this might be the optimum, but I was wondering if your group is totally opposed to the operation if there is a binding agreement that these facilities will be installed within a specified period of time.

MR. CRAMER: We feel, in the case of the Zion plant, that it is perfectly feasible that Commonwealth Edison should be able to install cooling facilities, if they begin immediately, prior to the time when they necessarily have to open that plant, and we are going to press for that. In the event a situation develops where we can reach a compromise agreement, I am sure we would be willing to discuss it. But I think that is what we ought to press for as a representative of the public interest.

MR. BLASER: The next speaker is David Comey, Director of Environmental Research, Businessmen for the Public Interest.

FROM THE FLOOR: Mr. Comey had to go to Racine to deliver a lecture on nuclear safety and he asked if he could be called in the morning.

MR. BLASER: Shall we break now? Or do you want to -- I am willing to stay if you want --

FROM THE FLOOR: I have asked to speak, sir. I filled out a card.

FROM THE FLOOR: I wrote a letter.

FROM THE FLOOR: Could I suggest that you ask for those people who cannot come back tomorrow --

MR. STEIN: Mrs. Botts, you took the words right out of my mouth. I am sorry I can't have you sitting up here with me.

Mrs. H. Sherman

How many people just can't come back tomorrow? All right. There are two.

MR. BLASER: How about ladies first — even today — Women's Lib. notwithstanding.

STATEMENT OF MRS. HARRIET SHERMAN,
CITIZEN, CHICAGO, ILLINOIS

MRS. SHERMAN: My name is Harriet Sherman. I am a citizen-taxpayer. I am on no foundation. I am not with any lobbying group, registered or otherwise. I am just a citizen, on no payroll.

The points of view made by a citizen might seem irrelevant or inappropriate to the technicians and politicians who set up Conferences such as this one. Nevertheless, the public has the right to present what it considers important, and sometimes it is the responsibility of the politicans and technicians to adjust their agendas to include what the public feels and needs to be said. The matter at issue is larger than plumes and B.t.u.'s, larger than the pollution issue.

It has to do not really with the electrical power structure of the country but the social power structure as well. To limit the discussion to technical points conceals the fact the public rights are being taken from them and handed to those few whose social power is increased by the decisions of Conferences such as this one.

Who will hear the public in this matter? The Atomic Energy Commission casually tosses out a citizen's statement for the margins might be half an inch too small or it is not double-spaced, which costs the citizen extra stencils to have made to double-space petitions.

The press, whose owners have interlocking interests with the power companies, ignore what does fit their interests.

Who are the scientists and technicians who set the so-called safety standards? How many of them are past or present employees of the power companies? How many are employees of universities whose board of trustees are men such as Morgan Murphy, Thomas Ayers and others -- these are local people; I am sure Michigan and Indiana have their own locals -- who are the directors and officers of the power companies.

Who are the power companies? All this fuss about 1° F., but how much fuss about the fact that these important public utilities are owned by hidden trusts? Start researching in your respective States. Trusts that are masks for what? In some cases, foreign cartels. The public has the right to know who is benefitting from these decisions of yours. Who is it that controls the utility that is critical in our daily lives?

Just yesterday the news reported Commonwealth Edison's concern that there will be brownouts in Chicago if the No. 3 Dresden plant doesn't get into operation soon. This so-called news report is obvious blackmail. But if Edison is not above blackmail, what else will they do to us through their control of more and more power? Last year they turned off electric power in Chicago to contract home buyers though these home buyers were not in arrears on their bills. It was apparent then that Edison was using its weight to crush the resistance of contract home buyers. How far will they go in time to come?

I am not going to ask Mrs. Botts to read this. I am putting into the record my petition before the AEC and I am going to read it myself because I think Mrs. Botts would choke on it.

I contend -- this was my fifth contention before the AEC when I requested to intervene a month ago -- I contend that not enough study regarding site, facing navigable waters of the Illinois River where the confluence of the DesPlaines and Kankakee join, and construction of this plant by Commonwealth Edison and Bechtel Industries.

Also the coincidence of the Chicago & Illinois Midland Railroad paralleling the below mentioned nature reserve. This reserve is called Goose Lake Prairie. A couple of years ago Mrs. Botts was all over the map asking everybody to push Goose Lake Prairie, and we spent -- the State of Illinois -- $2.5 million barely a year and a half ago. Yes, Mrs. Botts, the Open Lands Committee. We spent $2.5 million to acquire this Goose Lake Prairie, right next to Commonwealth Edison's Dresden plant. Why didn't you tell us that, Mrs. Botts? There is no sign where the prairie really is. You would have to go by the tracks of the Commonwealth Edison Midland Railroad to find it. You have done a great disservice to the citizens. Maybe something will happen -- maybe an investigation. It is a real goose! (Laughter) This area is the last of the so-called original prairie in Illinois, a heritage of all of the citizens. That is what the propaganda from the Open Lands Committee told us.

I am just ending this now, but I am putting this into the record. It is a big joke, especially for the taxpayers. It is a sad situation.

MR. STEIN: Thank you very much.

(The document above referred to follows in its entirety.)

In the Matter of
Commonwealth Edison (Dresden Nuclear Power Station Unit 3)
Requesting leave to intervene of Harriet Sherman

Docket No. 50-249

NOTICE

To: Mr. Stanley T. Robinson Jr.
Office of the Secretary, U.S. Atomic Energy Commission
Washington, D.C. 20545

Mr. Joseph B. Knotts, Jr.
Counsel for the AEC Regulatory Staff,
U.S. Atomic Energy Commission, Washington, D.C. 20545

Algie A. Wells, Esq.
Chairman, Atomic Safety and Licensing Board Panel
U.S. Atomic Energy Commission, Washington, D.C. 20545

Mr. Leroy Stratton
Bureau of Radiological Health,
Illinois Department of Public Health
Springfield, Illinois 62706

Mr. Arthur C. Gehr, Esq.
Isham, Lincoln & Beale
One First National Plaza, Forty-Second Fllor
Chicago, Illinois 60670

Mr. Byron Lee, Jr., Assistant to the President
Commonwealth Edison Company
P.O. Box 767, Chicago, Illinois 60690

Mr. David Dinsmore Comey, Director, Environmental Research
BPI Action Fund, Inc. - Suite 1001
109 N. Dearborn, Chicago, Illinois 60602

Mr. Gordon B. Sherman, President
BPI Action Fund, Inc., Suite 1001
109 No. Dearborn, Chicago, Illinois 60602

Please take notice that on ______________________________ I am sending the Atomic Energy Commission, 20545, Washington, D.C., Secretary, to be filed, this Notice, Affidavit and attached petition with exhibits, copies of which are herewith served upon you.

Harriet Sherman, citizen, pro se,
7110 So. Crandon Avenue
Chicago, Illinois 60649

PLaza 2-3083

Subscribed and sworn to before me

this ________ day of ____________, 1971.

Notary Public

STATE OF ILLINOIS) SS. AFFIDAVIT including PROOF OF SERVIC
COUNTY OF COOK)

Harriet Sherman, being first duly sworn on oath, deposes and says:

1. That she is the one who is asking for leave to appear and intervene in this matter; that the petition and exhibits attacheded hereto is by her subscribed; that she believes the facts contained therein to be correct and true; that the other matters contained therein are matters of record or of law, and that in either case she believes them to be true.

2. That she served the within Notice and this Affidavit together with Petition on those named by mailing copies of the same to attached list, duly addressed, sealed and stamped envelopes, and depositing in U; S; Mail Box in front of Post Office, 2207 E. 75th St., Chicago, Illinois on January 25, 1971.

Additional copies have been sent to Dept. of Transportation, U.S. Dept. of Health, Education & Welfare; U.S. Dept. of Defense; the Office of the President of the United States; William Scott, Attorney General of Illinois; John Mitchell, Attorney General of the United States; etc.

Harriet Sherman

Subscribed and sworn to before me

this ____________ day of ______________, 1971.

Notary Public

BEFORE THE ATOMIC ENERGY COMMISSION

PETITION TO INTERVENE IN THE GRANTING)
OF LICENSE TO COMMONWEALTH EDISON)
COMPANY OF CHICAGO) Docket No.
) 50-249
REQUEST FOR LEAVE TO FILE APPEARANCE)
OF HARRIET SHERMAN: Citizen, Taxpayer,)
Pro Se and REQUEST FOR COMMISSION)
INVESTIGATION.)

Now comes Harriet Sherman, pro se, and requests the Commission

1. Leave to intervene in this hearing.
2. Request this Commission to investigate in the above as hereinafter set forth.
3. That there be open hearings for press and public.

Before stating contentions I wish to ask that one of the Commissioners, Mr. Clarence E. Larson, disqualify himself, inasmuch as he is President of the Nuclear Division, Union Carbide Co., 270 Park Ave., New York, N.Y., according to Standard &Poor's Directory and his immediate superior would be Mr. J. Harris Ward, Director of Union Carbide and Chairman of the Board of Commonwealth Edison of Chicago, the applicant, thus creating a conflict of interest.

I would like to have information regarding Mr. James T. Ramey's background in addition.

Mr. Wilfred E. Johnson, one of the Commissioners has worked for General Electric in the past. I hope that this will not allow for undue favortism to Commonwealth Edison inasmuch as they have a working agreement with Edison at the Dresden Plant.

In addition, I wish to speak for my fellow citizens and protest that a great burden is put upon the resources and educational background of any citizen daring to protest the actions of his government. Questions of his interest in a subject by the government (See Exhbibit A - Budget of the U.S. Govt., AEC) should not even be asked. It is enough that the citizen is sufficiently aware and wants to know what is happening. Unnecessary hardships are being placed against the citizen who is taxed and forced to support research, buy expensive typewriters, copying machines, paper, etc., and then forced to spend additional sums asking the government what they are doing.

I support an educational system that does not include law as a necessity for every citizen. If the government by innuendo in its regulations and rules literally forcing citizens to support an additional private burden; it means no citizen can any longer afford to go to the government or must go to a profession that some consider a self-serving FIFTH COLUMN within the structure of government.

Finally, this petition originally was presented to your Commission, sent certified mail as of Dec. 18, 1970. After checking the certified return cards, I find that the mail was received by your Commission and Regulatory Staff on Monday, Dec. 21st and Tuesday, Dec. 22nd respectively, and signed by a Mr. Sellers and Mr. Sachs. Mail is generally considered filed the moment it hits the box at the Post Office.

I note that though my petition was submitted before the December 20th deadline, the AEC did not take action on it until January 8, 1971, because of what they called "administrative oversight." In the meantime, the AEC granted Commonwealth Edison permission to load radioactive fuel and "perform certain tests" at the Dresden Plant. This action was taken in agreement with Businessmen for the Public Interest, a private group which has also filed a petition to intervene. (See Exhibit B).

STATEMENT

Harriet Sherman states that she is a citizen of the United States and a resident of Cook County, Illinois. She is a taxpayer and an occassional researcher into court corruption and judicial conflicts of interest.

She states further, as follows:

I recently became aware of certain discrepancies regarding the licensing of the Dresden nuclear power plant, on Route 66, near Morris and Dwight, Illinois. Upon exploring certain facts on my own, it became apparent to me that neither the public's interest nor mine has been adequately safeguarded in the licensing and the further proposed licensing of Commonwealth Edison Company to operate this atomic facility.

My contentions, with supporting exhibits, are submitted below. Further information is available.

CONTENTIONS

1. I contend that inadequate publicity concerning previous hearings prevented adequate protection to the health and welfare of my fellow citizens from the possibility of dangerous nuclear emissions from this plant.

A children's hospital, the William Fox Center, and a women's reformatory are located at Dwight, in Livingston county, downwind from the Dresden plant. Although these children and the women prisoners are dependent upon public officials for their safety, there was no representation from Livingston county at previous hearings on this matter. Further, these hearings were so poorly publicized that the head of the Fox Center told me, in a telephone conversation, that he did not even know about them.

(In the case of the women prisoners, the AEC must be concerned that it does not violate their constitutional guarantee against cruel and unusual punishment, by permitting them to be kept in a declining environment.

2. The Union Stockyards has announced that it will move to a site which is less than 10 miles from the Dresden plant. The Campbell Soup Company processes both asparagus and tomatoes in the area. The counties adjacent to this plant, including Grundy, Livingston and LaSalle counties, are major sources of grain, poultry, cattle feed, dairy products and other agricultural produce for the Chicago market and other parts of the country.

Certainly the public which will purchase the meat and food products from these counties is entitled to an environment which does not contaminate the food before they receive it. In previous AEC hearings pertinent to the Dresden plant, assuarances of safety were given by university scientists whose testimony must be impeached on the ground that these scientists are in a practical sense the employees of the party seeking the license.

The annual report of Commonwealth Edison for 1969 notes, for example, that one of its directors, Lowell T. Coggeshall, is a trustee of the University of Chicago. Standard biographical references indicate that he is also a vice president of the University of Chicago. Among the other officers and directors of this company, J. Harris Ward is a trustee of the University of Chicago.; Joseph L. Block, Albert B. Dick III, Brooks McCormick, and Morgan Murphy are trustees of the Illinois Institute of Technology. Mr. Murphy is also a member of the Citizen's Board of Loyola

University, and John Andrew Barr is a trustee of Northwestern University.

I contend that professors and students whose livelihood and careers are in the hands of trustees, who are at the same time applicants for the license in question, can not be regarded as impartial witnesses.

3. It came to my attention last fall that members of an organization known as the Southside Contract Buyers League were being harrassed in various ways, apparantly in order to force them to leave the homes which they had been buying under contract arrangements with Universal Builders, Inc. and its subsidiary, Chatham Town Homes, Inc. Some of these contract buyers had been evicted from their homes and had returned to them, but some of the others had not been evicted at all. In either case, however, they were subjected to harrassment, such as the removal of plumbing from their homes, the smashing of furniture, mysterious knockings upon their windows at night, telephone threats, etc. These things were obviously intended to intimidate the contract buyers.

In my capacity as a civic researcher, I had occasion to visit many of the contract buyers and to attend their meetings. I saw at first hand the results of this harrassment--broken windows, kitchens from which sinks had been torn, the mounts from which gas meters had been removed by unidentified strangers, etc. I was told by these contract buyers that their electrical service had been arbitrarily discontinued by the Commonwealth Edison Co., although they were not in arrears in their bills. They regarded this--and rightly so, I believe--as part of the harrassment to which they were being subjected.

Later, on Aug. 25, 1970, various members of this group filed suit in the Circuit Court of Cook County (70C 12091), charging that unknown to them, the Catholic Archbishop of Chicago was the beneficial owner of the homes they were seeking to purchase.

The suit, still pending, also charged that a Catholic organization, the Gamaliel Foundation, while purporting to support the Contract Buyers, was actually "attempting to prevent losses to contract sellers and to their business associates namely defendant Catholic Bishop of Chicago."

Named also as a defendant was one Gordon Sherman, who is known to the Atomic Energy Commission in his role as head of the Business

Men for the Public Interest, Inc., an intervener in this hearing.

The suit charged that Gordon Sherman had "used the defendant Gamaliel Foundation and other means as a conduit, funnel, or front, to convey money to some of the defendants... all in respect to the matters herein described, to cool off and compromise these plaintiffs' rights, and to attempt to force the resumption of payments by members of SS CBL to the contract sellers."

It should be noted here that both the Catholic Archbishop of Chicago and the Gamaliel Foundation, which was established and operated by the Jesuit Society, are subject to the spiritual and practical leadership of Pope Paul IV, "Supreme Pontiff of the Universal Church" and "Sovereign of Vatican City," as he is described in his official title.

It should be further noted that the President of the United States last year appointed Henry Cabot Lodge Jr. as the official representative of the U.S. government to the Vatican government, of which Pope Pius VI is, as pointed out above, the sovereign head.

Thus, in effect, the Catholic Archbishop of Chicago is the agent of an alien or foreign government.

I submit as an attached exhbit, a reproduction of pp 94-95 of the book, "The Vatican Empire," by Nino Lo Bello, (Pocket Book edition, 1969), wherein there is reference to the Montecatini Co., which is "bound to the Vatican with hoops of steel," and to the Edison Company, with which it was merged to form Montecatini-Edison.

It is further described in this book how the Vatican state, through its vast financial investments has obtained control of various public utilities, including electric utilities, in Italy and other countries.

The acquiring and control of these utilities by the Vatican state is usually done in a concealed manner, so that it is not publicly known that the company is in fact owned or otherwise dominated by an alien or foreign interest, that is, the Vatican state and its agents. Often this control is achieved through the Vatican's so-called "Uomini di Fiducia," a foreign term meaning, "men of Trust," who serve as its nominees on the boards of directors of such firms.

An article appearing in the Chicago Daily News, Dec. 31, 1970, headlined, "Catholic Assets Here Listed at $85 Million," refers to a financial report which was recently published by the Catholic

Archbishop of Chicago. In this article it is stated that:

"The report listed security investments of the archdiocese as worth almost $30 million last June 30."...and that "Archdiocesan investments are handled by the investment counseling firm of Stein, Roe & Farnham, which last June 30 had placed almost $9 million in common stocks, $8.2 million in U.S. government securities and almost $8 million in corporate bonds."

Thus it is known that Catholic Archbishop of Chicago, an agent of the Vatican state, has invested millions of dollars in unidentified corporations.

I submit that if these investments have been made in the stocks and bonds of the Commonwealth Edison Co., that it would follow in logical sequence that the Catholic Archbishop of Chicago would thereafter use his influence as an owner of the bonds and shares to elevate his "Uomini di Fiducia" to the board of directors of Commonwealth Edison Co. and thus control it in the interests of a foreign state.

I further note that under U.S. Code Title 42 #2153 and Title 42 #2133, that a license to operate a nuclear electric plant may not be issued to an alien or foreign-controlled company.

I contend, therefore, that it is the obligation of the AEC to investigate the ownership and control of the Commonwealth Edison Co., through the hearings in which I seek to intervene, before issuing any further licenses to this company.

4. It is primary to the interests of the people of Chicago that no agency of the government, civil or military, and that no private group of individuals, such as the directors of a corporation, for example, should ever be in a position to use electrical power, a vital essential of modern urban life, as a weapon of control over the people.

It is contended here that such a possibility exists [illegible] in the present licensing situation, and I am seeking to intervene in this hearing because, quite frankly, I do not trust you. On the contrary, there is a seeming appearance of collusion in this respect between the AEC, the Commonwealth Edison Company, and the Businessmen for the Public Interest, Inc.

This doubt--which I believe is shared by many of my fellow citizens--can only be reduced if there is a public airing of the matter and a cynical public observer, such as myself, is present not merely to observe your dealings, but with full right to delve into all aspects of your operations and organizations, as they appear to threaten the public safety.

Briefly, in support of my contention, I offer the following:

a. The Atomic Energy Commission was born in the wartime secrecy of atomic bomb development and production, and one of its major functions today is the gathering of intelligence regarding the military nuclear capacity of other nations. Furthermore, as shown in any edition of the Congressional Directory, a publication of the United States Printing Office in Washingto,n, D.C., the Atomic Energy Commission includes a Division of Intelligence, a Division of Military Application , and a Military Liaison Committee.

The Atomic Energy Commission, therefore, is obviously not a purely civilian agency, but one with military overtones and military interconnections.

It is worth remembering that only within recent weeks, the Chicago news media have carried reports of spying upon noted local public figures by military intelligence agencies.

As for the Commonwealth Edison Co., I point to the following:

a. In recent, little-publicized testimony before a Congressional committee, a spokesman for the Electronic Industries Association, speaking against repeal of the Emergency Detention Act of 1950, said "Detention of security risks whether Communists, radical members of the so-called 'New Left,' or whoever, in time of dire need, we believe, is a proper course of action." (See Chicago Sun-Times, June 22, 1970, p. 64). I believe that Commonwealth Edison Co. is closely linked to the Electronic Industries Association, either through its own membership, or for example, through its partnership with the General Electric Co. at the Dresden plant.

b. As cited in my third contention, in the instance of the southside contract home buyers, this company has already shown a willingness to use its control of electrical service as a means to force Chicago citizens into desired patterns of political and economic behavior.

c. It must be noted, too, that William Ayers, the son of Thomas G. Ayers, president of Commonwealth Edison, has been identified in the press as a leader of the so-called "Weathermen", an organization which is regarded by many thoughtful people as a group whose purpose is to create incidents such as the bombing of public places (perhaps including electrical plants), which will bring about repression of the people by the government.

It is strangely coincident that William Ayers was a close associate of one Diane Oughton of Dwight, Illinois, who was supposedly killed last year in a Weathermen "bomb-factory", all of this according to a most questionable series of articles appearing in the Chicago Daily News last September. (See attached exhibits). The Chicago Daily News is a publication owned by relatives of the Oughton family.

It is further strangely coincident that Diane Oughton is the daughter of James Oughton, president of the First National Bank of Dwight (which adjoins the Fox Childrens Center), head of farming and dairy corporations in the area downwind from the Dresden plant, and an individual whose financial future is clearly tied with the development of the area (as through the location there of factories and refineries, near a nuclear power source).

d. Furthermore, as indicated in attached reproduced pages from the book, "Captive City" by Ovid Demaris, the Commonwealth Edison Co. has been closely associated with coal companies which Demaris describes as crime-dominated. Along this line, I make reference also to Morgan Murphy Jr., son of a Commonwealth Edison director, who is at the present time a business partner of one Thomas A. McGloon, an owner of the Civic Center Bank of Chicago, along with such crime figures as John D'Arco, John P. Kringas, and Anthony Fellichio, and who have been so identified in court records.

It appears to me that a company, such as Commonwealth Edison, if it is intertied with crime, is subject to blackmail pressure by federal authorities seeking at some time to use electrical power to suppress the rights and rightful actions of Chicago citizens.

e. In reference to Gordon Sherman, head of Businessmen for the Public Interest, Inc., it has already been pointed out that he has been named in a court suit, which I believe has merit, as a collaborator with the Gamaliel Foundation in attempting to subvert the interests of the Chicago contract home buyers while acting in the guise of a friend. If this is later shown to be true, then, of course, it would not be unlikely that his role is similar here, that is, falsely wrapped in the mantle of a protector of the public, whereas he might in fact again be "working both sides of the street," as stated in the court action.

WE WANT NO POLITICAL BLACKOUT OF ELECTRICAL POWER IN CHICAGO !

5. I contend that not enough study regarding site (facing navigable waters of the Illinois river) and construction of this plant by Commonwealth Edison and Bechtel Industries. Also the coincidence of the Chicago & . . Illinois Midland Railroad parallelling the below mentioned nature reserve. I contend that with the acquisition of Goose Lake Prairie by the taxpayers of Illinois for the sum of $2,000,000 one and a half years ago, this area will become a real goose to the citizens by prematurely killing off the last original prairie in Illinois (a heritage of all the citizens). Much rare flora and fauna will be irretreivably lost.

CONCLUSION

The circumstances of all this require an investigation. Further, the public interest requires such an investigation.

WHEREFORE, Harriet Sherman, as aforesaid asks for an investigation, and for such other procedure as the public interest demands.

/s/ Harriet Sherman , pro se,
7119 S. Crandon Avenue
Chicago, Illinois 60649

PLaza 2-3083

MR. BLASER: There is a gentleman who is not going to be able to be here tomorrow who is able to speak now.

DR. BERTONCINI: I apologize to the Board. I only have ten copies of this statement.

STATEMENT OF DR. PETER BERTONCINI, THE COMMITTEE FOR ECOLOGICAL ACTION, BELLWOOD, ILLINOIS

DR. BERTONCINI: I am Dr. Peter Bertoncini. I am employed at Argonne National Laboratory. I am a chemist. I am not an expert in nuclear power generation.

At this time, I am making a statement as a private citizen as a member of a Committee for Ecological Action.

We have a short summary at the beginning: The Committee for Ecological Action recognizes there exists a controversy in the scientific community over the effects of hot water discharges on the Lake Michigan ecosystem. Because of this controversy, we take this opportunity to state our basic opposition to the use of Lake Michigan as a laboratory to study the effects of thermal pollution as has been suggested by representatives of certain power companies.

P. Bertoncini

We appreciate the efforts of the power companies to avoid at all costs unnecessary capital expenditures. However, we feel that such a short-sighted goal should not be permitted by the U.S. Government in view of the obvious financial benefits to be realized from a viable Lake Michigan; particularly, since the present state of the art of closed cycle cooling system technology is such that it is unnecessary to use once-through cooling at any existing or planned source of thermal discharge to Lake Michigan.

While I personally agree with the representatives of certain major power companies that nuclear power is the answer to our future power needs, a view that is not shared by everyone in our organization, I would like to state that unless more concern is shown by government and industry alike to the undesirable side effects of the tremendous quantities of heated effluent which is a by-product of power generation I will be opposed to each and every nuclear and fossil fuel plant on the lake.

As we stated in our abstract, we propose closed cycle cooling systems for all potential Lake Michigan heat sources. The present state of the art in the cooling tower industry is rapidly advancing. Recent testimony of Mr. Joe Ben Dickey of the Marley Company, a cooling tower manufacturer, before the Illinois Commerce Commission hearing on the question of Commonwealth Edison's intention to build a 5,200 MWe. station in Brookfield Township, Illinois revealed that there presently exists technology to build cooling towers of the size necessary to cool the two Zion units, for example, at a small percentage of the total capitalization of such stations and with none of the dire effects to the environment predicted by the representatives of certain power companies.

I would like to summarize a part of Mr. Dickey's testimony which appears in Docket No. 56-034, the January 25, 1971, hearing of the Illinois Commerce Commission.

Parenthetically I should add here that Mr. Dickey was subpoenaed to testify and it should be noted that cooling tower manufacturers have not volunteered to testify against their potential customers. It might be to the Conference's benefit to call some witnesses from the cooling tower industry to testify as regards cost estimates of backfitting, and so on, since there seems to be a tremendous contention, and it seems to be a very grave point of concern of the Illinois Pollution Control Board in particular.

As regards wet mechanical draft towers, Mr. Dickey states that he has knowledge of some 65 to 70 major mechanical draft towers built or contracted from 1960 through 1972 and some 42 natural draft towers built or contracted in the same period in the U.S. I should add he further states the aggregate total for mechanical and natural draft towers he has been associated with to be approximately 47,000 MWe. The testimony covers the development of wet mechanical and natural draft towers from the installation of machines of approximately 100 MWe. in the early 1960's through the contracting of machines of 1,100 to 1,300 MWe. machines in the recent past and the application of such equipment to installations of 2,000 to 5,000 MWe. generating capacity.

The relevant testimony in regard to mechanical draft towers is contained in pp. 2296 through 2306 of the ICC proceedings -- along with other pages of Mr. Dickey's testimony -- and in regard to natural draft towers is contained in pp. 2307 through 2321. The costs of such towers is estimated by Mr. Dickey to be less than $20 million for the mechanical draft towers and $34 to $36 million for the natural draft towers for the 5,200 MWe. installation proposed for Brookfield Township. Scaling down to the 2,200 MWe. installation at Zion, for example, we would, I suppose, get a proportional decrease so that the backfitting would perhaps be of the same order of magnitude as the proposed installation in Brookfield

Township. Such an expenditure seems to us to be miniscule compared to the potential damage to the lake which could result from unchecked thermal discharges.

Mr. Dickey also addressed himself to the exaggerated claims of certain power industry spokesmen as to the environmental effects of cooling towers. His testimony as well as that of Dr. Eric Aynsley corroborates the findings of the Department of the Interior's publication on the "Feasibility of Alternative Means of Cooling for Thermal Powerplants Near Lake Michigan," Mr. Dickey also testified of a recent breakthrough in the design of wet cooling towers which would virtually eliminate the tendency of these towers to fog and ice. The breakthrough involves a combination of wet and dry towers to remove the fogging problem. He mentioned laboratory tests which were quite impressive to Dr. George McVehil who had predicted adverse effects due to the siting of cooling towers along the lake. Dr. Hosler, Dean of Earth Sciences at Penn State and a meteorologist, was also quite enthused about this development. Subsequent personal conversations I have had with officials at the Marley Company have indicated that a prototype is installed and operating in St. Joseph, Missouri at the St. Joseph Power and Light Company station and that preliminary results as of several weeks ago show a reduction by 75 percent in the icing and fogging. This reduction was obtained without any optimization of the equipment. These developments should go far towards removing the last objections to the installation of closed cycle cooling by the power industry.

Our organization has thus concluded after studying the testimony before the ICC, and after reading various publications sponsored by the U.S. Government as well as material furnished by Commonwealth Edison, that it would be folly to jeopardize the viability of Lake Michigan for a few tenths of a mill/KWH difference in electrical power cost to the consumer.

MR. STEIN: Thank you very much.

Are there any comments or questions?

You know, I sit through these things and I always figure that one of these days I am going to learn something new. Today I really learned something new: that when someone starts a sentence with "retrofitting," the cost estimate is going to be higher than if they start the sentence with "backfitting," and with that we will stand recessed until 9:30 tomorrow.

DR. BERTONCINI: Mr. Chairman, I have 1,400 signatures supporting our position on --

MR. STEIN: That will be received as an exhibit.

(The documents referred to by Dr. Bertoncini will be on file at Hq. EPA and the Regional Office, Chicago, Illinois.)

(The Conference adjourned at 5:25 p.m.)